

PROJECT I.D. 1060-27-00
I-94 EAST-WEST CORRIDOR
70TH STREET TO 16TH STREET

MILWAUKEE COUNTY, WISCONSIN

FINAL ENVIRONMENTAL IMPACT STATEMENT

and Final Section 4(f) Evaluation

Submitted Pursuant to 42 U.S.C. 4332(2)(c) and 49 U.S.C. 303
by the

U.S. Department of Transportation, Federal Highway Administration,
State of Wisconsin Department of Transportation

Cooperating Agencies

U.S. Department of the Interior, National Park Service
U.S. Army Corps of Engineers
Wisconsin Department of Natural Resources (pursuant to 23 U.S.C. 139)

APPROVALS

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ABSTRACT

The I-94 East-West Corridor study area includes I-94 from 70th Street to 16th Street, a distance of about 3.5 miles. This corridor has safety issues and design and operational deficiencies, including closely spaced interchanges, a combination of left-hand and right-hand exit and entrance ramps, and deteriorated pavement. As traffic increases, safety and traffic operations on this corridor will continue to deteriorate. By 2040, increased traffic volumes will cause nearly this entire section of I-94 to operate at level of service D to F during peak periods. The Draft Environmental Impact Statement (EIS) was approved on November 4, 2014. The Draft EIS evaluated the social, environmental, and economic impacts of the No-build alternative and a range of Build Alternatives, as well as the extent to which these alternatives address the project's purpose and need. The Final EIS documents the input received on the Draft EIS and identifies the preferred alternative. A review period for this document will end on March 14, 2016, or 30 days after the Notice of Availability appears in the *Federal Register*, whichever is later. Comments may be submitted to:

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National Environmental Policy Act Statement

The National Environmental Policy Act of 1969, as amended (42 United States Code 4332) requires that all federal agencies prepare a detailed Environmental Impact Statement (EIS) for major federal actions that will significantly affect the quality of the human environment. The Federal Highway Administration (FHWA) is therefore required to prepare an EIS for proposals funded under its authority if such proposals are determined to be major actions significantly affecting the quality of the human environment.

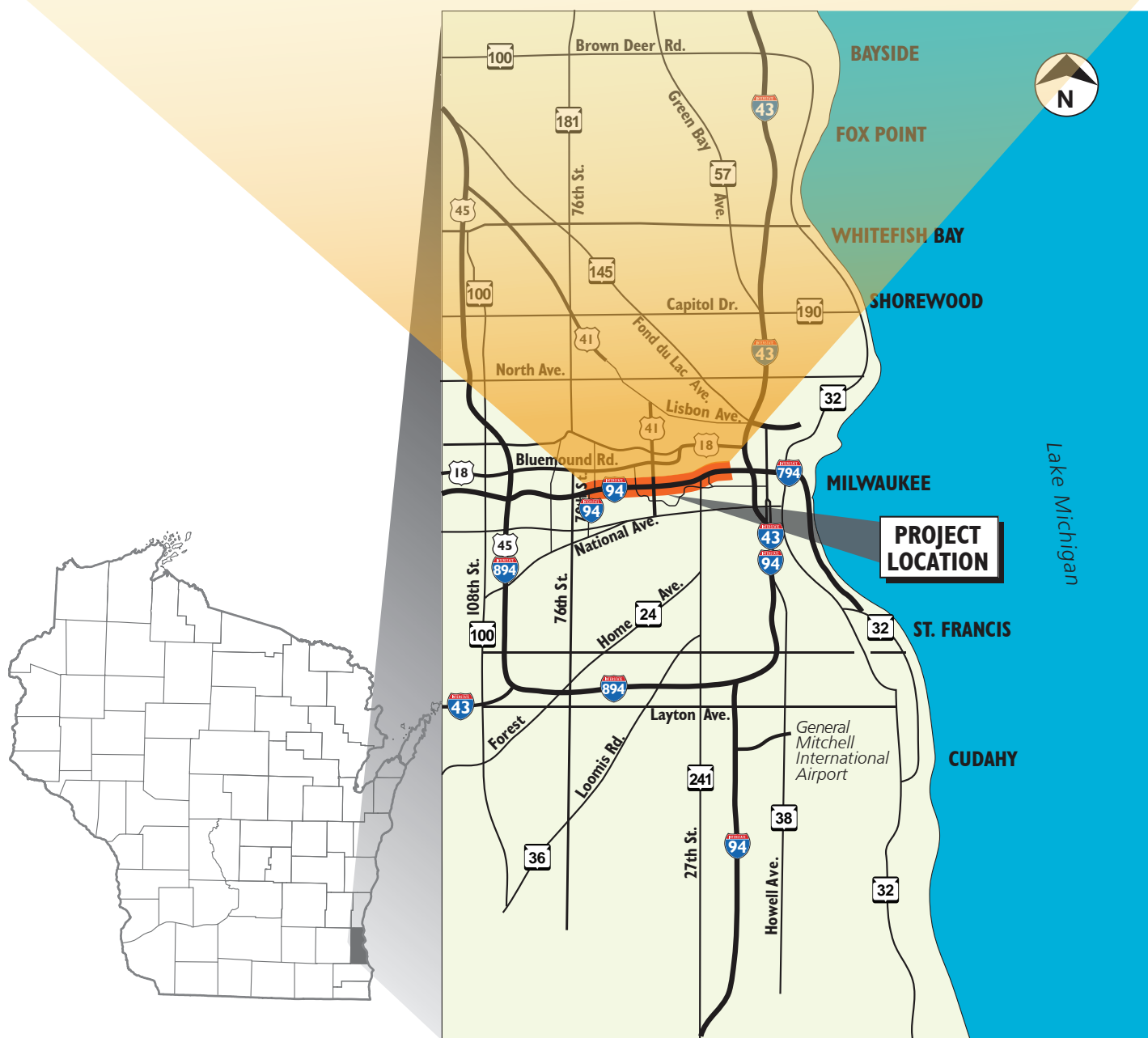
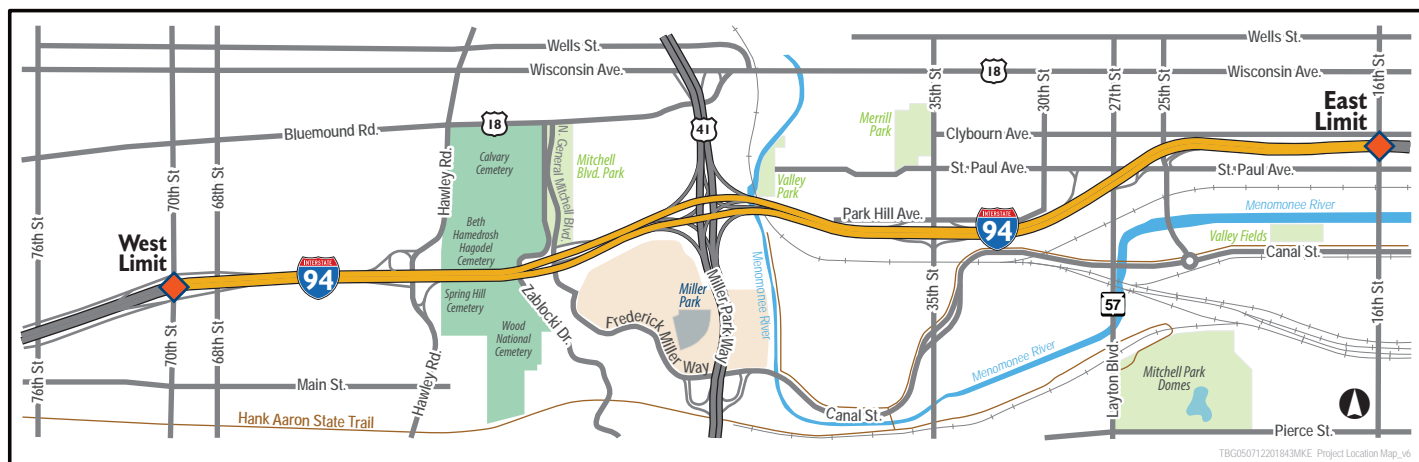
The EIS process is carried out in two stages. The **Draft EIS** is circulated for review by federal, state, and local agencies with jurisdiction by law or special expertise, and made available to the public. The Draft EIS must be made available to the public at least 15 days before the public hearing. A 60-day comment period is provided from the date the Draft EIS availability notice is published in the *Federal Register*. The Wisconsin Department of Transportation (WisDOT) must receive agency comments on or before the date listed on the front cover of the Draft EIS unless a time extension is requested and granted by WisDOT and FHWA pursuant to 23 USC 139(g)(2)(A). A 2-week extension to the comment period for the Draft EIS was requested and granted. After the Draft EIS comment period has elapsed, work may begin on the Final EIS.

The **Final EIS** includes the following:

1. Identification of the preferred course of action (alternative) and the basis for its **identification**.
2. Basic content of the Draft EIS, along with any changes, updated information, or additional information as a result of agency and public review.
3. Summary and disposition of substantive comments on social, economic, environmental, and engineering aspects resulting from the public hearing/public comment period and agency comments on the Draft EIS.
4. Resolution of environmental issues and documentation of compliance with applicable environmental laws and related requirements.

Final administrative action by FHWA (Record of Decision) cannot occur sooner than 90 days after filing the Draft EIS, or 30 days after filing the Final EIS with the U.S. Environmental Protection Agency. Both the Draft and Final EIS are full-disclosure documents that provide descriptions of the proposed action, the affected environment, alternatives considered, and an analysis of the expected beneficial or adverse environmental effects.

A federal agency may publish a notice in the *Federal Register*, pursuant to 23 United States Code §139(I), indicating that one or more federal agencies have taken final action on permits, licenses, or approvals for a transportation project. If such notice is published, claims seeking judicial review of those federal agency actions will be barred unless such claims are filed within 150 days after the date of publication of the notice, or within such shorter time period as is specified in the federal laws pursuant to which judicial review of the federal agency action is allowed. If no notice is published, then the periods of time that otherwise are provided by the federal laws governing such claims will apply.



Summary

Description of the Proposed Action

The proposed action is to reconstruct Interstate 94 (I-94) between 70th Street and 16th Street in Milwaukee, Wisconsin. The scope of the proposed action is to rebuild the freeway and bridges, modify interchange access to improve safety and traffic flow, and reconstruct local streets affected by the freeway reconstruction.

The proposed action would accomplish the following:

- Maintain a key link in the local, state, and national transportation network.
- Address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes.
- Replace deteriorating pavement.
- Accommodate existing and future traffic volumes at an acceptable level of service.

The project would neither require nor foreclose future transportation improvements identified in the regional transportation plan. The project would provide a safer and more efficient transportation system in the I-94 East-West Corridor, while minimizing impacts to the natural, cultural, and built environment to the extent feasible and practicable.

The study area termini are 70th Street on the west and 16th Street on the east. The service interchanges along I-94 at 68th Street/70th Street, Hawley Road, Mitchell Boulevard, 35th Street, and 25th/26th/28th Street are included in the study, as is the Stadium Interchange¹ (**Exhibit S-1**). The Bluemound Road/Wisconsin Avenue/Wells Street service interchange with US 41² is also included as part of this study. At each interchange, the project limit extends north/south until each crossroad ties in to existing alignment. The termini for the study generally matches the termini for two previously completed studies of the southeastern Wisconsin freeway system: the Zoo Interchange study, located west of the I-94 East-West Corridor, and the Marquette Interchange study, located to the east.

The Wisconsin Department of Transportation (WisDOT) and the Federal Highway Administration (FHWA) are the lead state and federal agencies, respectively, for the project. The Draft EIS was circulated for review in November 2014, and public hearings were held on December 3 and 4, 2014.

Purpose and Need for the Project

The purpose of the project is to address the deteriorated condition of I-94, obsolete roadway and bridge design, existing and future traffic demand, and high crash rates. A combination of the following factors demonstrates the need for the transportation improvements in the I-94 East-West Corridor:

- System linkage and route importance (Section 1.3.2)—I-94 is a major east-west freeway link across the northern United States and is part of the National System of Interstate and Defense Highways. I-94 is also designated a federal and state “long truck route” and a backbone route in WisDOT’s *Connections 2030 Long-Range Multimodal Transportation Plan*. I-94 is a critical link in Milwaukee County’s freeway system.

¹ The current Stadium Interchange was designed and built to function as a system interchange in anticipation of planned freeway development. However, since the current US 41 (now WIS 175) was never fully developed as a freeway, and the route does not function as a freeway for an appreciable distance north and south of the interchange, the interchange is not technically classified as a system interchange by FHWA. Throughout this document, the existing Stadium Interchange is generally referred to as a system interchange. FHWA’s classification of the type of interchange, as it pertains to the existing interchange, has no bearing on the proposed design of the updated interchange. The proposed Stadium Interchange design, as part of the preferred alternative, is referred to as a “hybrid” interchange. This term can also be synonymous with a high-level service interchange. Because previous project documentation, including the Draft EIS, referred to the current Stadium Interchange as a system interchange and the proposed design as a “hybrid” interchange, and since the terminology has no bearing on the proposed design as part of the preferred alternative, the terminology has been retained in the Final EIS.

² US 41 in the study area has been re-designated as a state highway (WIS 175) due to the conversion of US 41 to I-41 and the rerouting of I-41/US 41 along I-894 and US 45. For the sake of the I-94 East-West Corridor study, the roadway will be called US 41 because the public knows the road by that name. The US 41 Interstate Conversion Project converted US 41 to an interstate highway from the Mitchell Interchange in Milwaukee to Green Bay via I-894, US 45, and US 41. This involves no improvements of the former US 41 route in the I-94 East-West Corridor (other than additional signing) and does not change the forecasted traffic volume on the roadways. Project signing was completed in late 2015. For more information on the US 41 Interstate Conversion Project, see the project’s website at: <http://www.dot.wisconsin.gov/projects/neregion/41/>.

In addition to serving long-distance travelers and regional and national freight movement, the study area freeway system is an important commuter route for many of the employees who work in Milwaukee County.

- **High crash rates (Section 1.3.3)**—From 2005 to 2009,³ there were 2,637 crashes on the freeway and interchange entrance/exit ramps, or roughly 1.4 crashes per day. Approximately 29 percent of the crashes resulted in injuries, and 3 crashes were fatal. Most crash rates in the I-94 East-West Corridor are at least 2 to 3 times higher than the statewide average for similar roadways (large urban freeways), and several sections are more than 4 times higher than the statewide average. On the study area freeway system, the most common types of crashes were rear-end, single-vehicle off-road, and sideswipe.
- **Existing freeway conditions and deficiencies (Section 1.3.4)**—This segment of I-94 was constructed in the early 1960s. Over the years, the concrete pavement has become worn and cracked. WisDOT resurfaced I-94 in the mid-1970s, late 1990s, and again in 2011–2012, which returned a smooth riding surface to the roadway, but did not address the cracks in the concrete or the voids in the gravel base under the pavement. In addition to the physical condition, there are other substandard design elements, such as inadequate ramp spacing, that must be addressed. Perhaps the most notable functional deficiencies are the closely spaced service interchanges and the combination of left- and right-hand entrance and exit ramps, which are contrary to driver expectations and result in major safety and operational problems, such as traffic weaving and congestion. The condition of bridges in the study area has deteriorated over the years due to age, heavier than expected traffic, road salt, freeze-thaw cycles, and water entering cracks in the bridges. At some locations, bridge clearances (the vertical distance from the pavement to the lowest portion of the bridge above the roadway) are below current accepted criterion.
- **Traffic volumes (Section 1.3.5)**—This segment of I-94 carries 143,000 to 160,500 vehicles on an average weekday (2009 volumes). Currently, during the heaviest traffic periods, level of service on I-94 ranges between level of service C and level of service F. By 2040 (the project's design year), traffic volumes are expected to rise to approximately 160,000 to 186,000 vehicles per day, which represents an 11 to 16 percent traffic increase over the current conditions. By 2040, I-94 would generally operate at level of service D to F during the morning peak period and at level of service E (severe congestion) or F (extreme congestion) in the evening peak period.

Section 1, Purpose and Need for the Project, discusses the factors in more detail. The need for the proposed improvements sets the stage for developing and evaluating possible improvement alternatives.

Alternatives Considered

Section 2, Alternatives Considered/Preferred Alternative, describes the range of alternatives developed to address the factors identified in Section 1, Purpose and Need for the Project, and describes the basis for retaining alternatives for additional study or eliminating alternatives from consideration. WisDOT and FHWA developed and evaluated a wide range of alternatives to address the deficiencies on I-94. The alternatives were presented to the public and assessed to determine their environmental impacts and the extent to which they fulfill the purpose of the project. The initial range of alternatives considered includes the following:

- **No-build alternative**—No safety or capacity improvements would be made. Only maintenance and minor improvements would be performed. This alternative serves as a baseline for comparison to the build alternatives.
- **Transportation System Management (TSM) (Section 2.5.2)**—This alternative includes measures to maximize the efficiency of the highway system to help alleviate or postpone the need to expand freeway capacity. The TSM element of the SEWRPC regional transportation plan recommends measures such as freeway traffic

³ The crash rates used for this project are based on crashes from 2005 through 2009. More recent data are not included due to changes in I-94 East-West Corridor traffic volumes from the Zoo Interchange emergency bridge repair work in 2010, the resurfacing of I-94 in 2011 and 2012, and the restriping of I-94 from the Marquette Interchange to the Stadium Interchange in 2013.

management (ramp meters, bus, and high-occupancy vehicle lanes on entrance ramps) and intelligent transportation systems (advanced traveler information for transit and highway travel conditions).

Given that almost all of the recommended TSM elements are already implemented, and congestion is still expected to reach level of service E and F in the design year, TSM will not, as a standalone alternative, address the project's purpose and need. Therefore, it was eliminated from consideration by WisDOT and FHWA as a standalone alternative.

- **Region-wide Public Transit and Transportation Demand Management (TDM) Elements (Section 2.5.3)**—This alternative includes ways to reduce personal and vehicular travel or to shift such travel to alternative times and routes, allowing for more efficient use of the existing transportation system's capacity through increased transit ridership and other strategies. The public transit system element of *A Regional Transportation System Plan for Southeastern Wisconsin: 2035* (Southeastern Wisconsin Regional Planning Commission [SEWRPC] 2006a) recommends several ways to increase mass transit in Milwaukee County.

TDM, as a standalone alternative, will not address the project's purpose and need and was eliminated from consideration by WisDOT and FHWA as a standalone alternative.

- **Build Alternatives:**
 - **Replace-in-Kind alternative (Section 2.5.4.1)**—The I-94 East-West Corridor would be replaced in its current configuration with 3 lanes in each direction, left-hand entrance and exit ramps, and closely spaced interchanges. The Replace-in-Kind alternative was not considered a reasonable course of action by WisDOT and FHWA and was removed from consideration.
 - **Spot Improvements (Section 2.5.4.2)**—Replacing the existing roadway and bridges in or close to their existing configuration, while addressing safety issues that can be fixed with little or no new right-of-way acquisition. The Spot Improvements alternative was not considered a reasonable course of action by WisDOT and FHWA and was removed from consideration.
 - **Modernization Improvements (6-lane) (Section 2.5.5.1)**—Replacing the existing roadway and bridges and completely reconfiguring I-94 to address the safety issues described in Section 1, Purpose and Need for the Project. TSM measures are included as part of the alternative.
 - **Modernization Improvements with Added Capacity (8-lane)**—Replacing the existing roadway and bridges and completely reconfiguring I-94 to address the safety issues described in Section 1, Purpose and Need for the Project, while adding 1 new lane in each direction to address the congestion issues described in Section 1. TSM measures are included as part of the alternative.

The modernization improvements with added capacity (8-lane) alternative was retained for detailed study following an alternatives screening process because it meets all purpose and need elements and has the appropriate number of lanes for existing and future traffic volumes. WisDOT and FHWA decided to eliminate the 6-lane Modernization Alternatives from consideration because they would not meet the project's purpose and need related to providing level of service D or better traffic operations in the 2040 design year (the 6-lane Modernization Alternative would result in levels of service E and F at several locations). The decision to eliminate this alternative is consistent with the 2035 regional transportation plan that recommends adding capacity to I-94.

WisDOT and FHWA developed and evaluated several 8-lane Modernization Alternatives for the project. The alternatives were evaluated on the following: ability to meet project purpose and need; construction cost; ability to avoid and minimize impacts to the natural and built environment; and input received from local governments, resource agencies, and the public. Federal and state laws, such as Section 106 and Section 110(f) of the National Historic Preservation Act, Section 4(f) of the U.S. Department of Transportation Act, and Section 404 of the Clean Water Act, were also considered in evaluating alternatives. Some alternatives were dismissed because they did not meet the project's purpose and need. Other alternatives meet the project's purpose and need but were dismissed because another alternative that also met the purpose and need had fewer impacts and/or a lower cost.

Alternatives Retained for Detailed Study

Following an extensive alternatives development and refinement process, the following alternatives were retained for detailed study for the I-94 East-West Corridor (Section 2.2):

- West segment (70th Street to Yount Drive, just west of the Stadium Interchange):
 - Add a fourth lane in each direction, with either no Hawley Road Interchange or a half interchange at Hawley Road (entrance/exit ramps to and from the west), and narrow lanes and shoulders through the cemetery area (**called the At-grade alternative**)
 - Add a fourth lane in each direction, with full Hawley Road Interchange and double deck (all up or partially down) through cemetery area (**called the Double Deck alternative**)
- East segment (Yount Drive to 16th Street)
 - Add a fourth lane in each direction, modified single-point interchange at the Stadium Interchange, and remaining nearly on-alignment east of 32nd Street (**called the On-alignment alternative**)⁴
 - Add a fourth lane in each direction, modified single-point interchange at the Stadium Interchange, and an off-alignment segment east of 32nd Street (**called the Off-alignment alternative**)
- No-build (retained for comparative purposes)

All of these build alternatives are interchangeable. For example, both the On-alignment and Off-alignment alternatives in the east segment are compatible with the Double Deck alternative in the west segment. The same holds true for the At-grade alternative. The four alternatives are:

- At-grade (west segment) and On-alignment (east segment)
- At-grade (west segment) and Off-alignment (east segment)
- Double Deck (west segment) and On-alignment (east segment)
- Double Deck (west segment) and Off-alignment (east segment)

In the west segment (70th Street to Yount Drive, just west of the Stadium Interchange), both the At-grade alternative and the Double Deck alternative would have 8 lanes (4 in each direction). The Double Deck alternative would include interchanges at 68th Street/70th Streets and Hawley Road. The At-grade alternative would include an interchange at 68th Street/70th Streets and either no interchange at Hawley Road or a half interchange at Hawley Road. The half interchange would have an entrance ramp to westbound I-94 and an exit ramp from eastbound I-94 to Hawley Road. There would be no westbound exit ramp or eastbound entrance ramp as part of the half interchange at Hawley Road option. For both alternatives, the existing interchange at Mitchell Boulevard would be removed and replaced with a new local road interchange within the Stadium Interchange.

In the east segment (Yount Drive to 16th Street) both the On-alignment alternative and the Off-alignment alternative would have 8 lanes (4 in each direction), and both would have interchanges at the Stadium Interchange, 35th Street, at or near 27th Street, and a new local road interchange within the Stadium Interchange.

Table 2-2 summarizes how the alternatives meet purpose and need.

Preferred Alternative

The Draft EIS did not identify a preferred alternative. Identification of a preferred alternative occurred after carefully reviewing input received at the public hearing and during the public availability period for the Draft EIS. Identification of the preferred alternative was also based on engineering factors, impacts to the human/natural environment, cost, and input from the public, state, and federal resource agencies, cooperating and participating agencies, and local officials. Identification of a preferred alternative was also performed in accordance with

⁴ Although this alternative is referred to as “On-alignment,” it would require right-of-way acquisition and commercial displacements on the south side of I-94. At its greatest extent, the On-alignment alternative’s centerline/median would be located about 50 feet south of the existing I-94 centerline near 29th Street.

Section 404 of the Clean Water Act, Sections 106 and 110(f) of the National Historic Preservation Act as amended, and the U.S. DOT's Section 4(f) law.

WisDOT and FHWA identified the At-grade alternative with the half interchange at Hawley Road in the west segment and the On-alignment alternative in the east segment as the preferred alternative (see Section 2.3).

As part of the preferred alternative in the west segment, WisDOT would construct some off-interstate improvements to mitigate the traffic impacts of partially closing the Hawley Road interchange. WisDOT would extend Washington Street to make it easier for drivers in the Hawley Road corridor to access the 68th Street/70th Street interchange and improve three local road intersections (70th Street/Greenfield Avenue; National Avenue/Greenfield Avenue; Miller Park Way/National Avenue) (**Exhibit 2-9**).

Environmental Impacts

Table S-1 summarizes the impacts of the No-build alternative, the 8-lane Modernization Alternatives, and the preferred alternative (see Section 3 for a detailed evaluation). The preferred alternative would convert 73 acres of residential, commercial, utility, and institutional land to highway right-of-way (Section 3.2). This total includes 12 acres for the Washington Street extension and 1 acre for local road intersection improvements. The preferred alternative would displace 8 residences and 10 businesses (there are two additional vacant commercial properties as of December 2015 that would be acquired as well) (Sections 3.5 and 3.6).

In regards to environmental justice (Presidential Executive Order on Environmental Justice 12898), the I-94 East-West Corridor project would not have a disproportionately high and adverse effect on minority and/or low-income populations (Section 3.9).

In the west segment, I-94 is adjacent to a National Historic Landmark (NHL), Northwestern Branch, National Home for Disabled Volunteer Soldiers NHL (Soldiers' Home NHL), and several other historic properties. FHWA, in consultation with the Section 106 consulting parties, has determined that the preferred alternative could be designed to result in No Adverse Effect on these properties. The Programmatic Agreement for this project stipulates the appropriate design review process and other steps to be taken to ensure there will be No Adverse Effect on the Soldiers' Home Historic District and the Soldiers' Home NHL (Section 3.24).

Final Section 4(f) Evaluation

The Final Section 4(f) Evaluation provides FHWA's final evaluation of the applicability of Section 4(f) to certain properties, assessment of use, and *de minimis* impact determinations associated with the preferred alternative. The preferred alternative would result in no more than *de minimis*⁵ impacts of any Section 4(f) properties. **Table 4-2** in Section 4 summarizes potential use of Section 4(f) properties in the study area as a result of the preferred alternative.

Economic Impact

The immediate economic impact of the Modernization Alternatives would be expenditure of state and federal funds to reconstruct this segment of I-94. WisDOT hosted a Cost Estimate Review session with FHWA to determine current year (2014) construction costs and estimated inflated costs in the year of expenditure. The cost includes such items as actual construction cost, design, real estate acquisition, utility relocation, and construction management. The cost estimate also considers project risks. The preferred alternative would cost \$852 million in 2014 dollars and \$1.106 billion in year-of-expenditure dollars.⁶ The preferred alternative cost includes \$18 million for the Washington Street extension and \$5 million for the three off-interstate intersection improvements (2014

⁵ A *de minimis* impact on a public parkland, recreational area, or wildlife and waterfowl refuge is defined as that which does not adversely affect the features, attributes, or activities qualifying the property for protection under Section 4(f). A *de minimis* impact determination is made for an historic site if FHWA makes a determination for a property of "No Adverse Effect" or "No Historic Properties Affected" through consultation under Section 106 of the National Historic Preservation Act, and the official with jurisdiction concurs with that determination.

⁶ Year-of-expenditure (YOE) is the total project cost, including inflation, assuming construction will take place during a given period of time in the future. For this study, construction is expected to take place between 2019 and 2023.

dollars). The Double Deck alternative combined with the Off-alignment alternative, which were not identified as the preferred alternative, would have cost \$1.15 billion (2014 dollars) or \$1.49 billion in year-of-expenditure dollars. Replacing the I-94 East-West Corridor in its current configuration would cost an estimated \$379 million in 2014 dollars.

Public Involvement

WisDOT and FHWA implemented an extensive public involvement program for the study, which is detailed in Section 5, Public Involvement and Agency Coordination during Draft EIS Preparation Prior to Draft EIS Availability, and Section 6, Public Involvement and Agency Coordination following Draft EIS Availability and Public Hearing. More than 300 meetings have been held with neighborhood, community, environmental, business, minority, low-income, and other stakeholder groups since 2012. Open-house public involvement meetings were held in August and December 2012, May and July 2013, and June 2014.

During the public involvement meetings, there was support for and opposition to different aspects of the project. The following were areas of controversy: adding a lane to I-94, a potential double deck freeway between Hawley Road and Mitchell Boulevard, potential freeway access changes, impacts to historic resources, mitigating visual impacts and traffic noise in neighborhoods adjacent to the freeway, and lack of transit alternatives.

Public hearings for the project were conducted on December 3 and 4, 2014. The public, local officials, and government agencies were encouraged to provide comments regarding the project. The availability period was open until January 27, 2015. This extended 74-day comment period exceeded federal requirements.

During the availability period, WisDOT received comments from the Corps of Engineers, U.S. Department of the Interior – National Park Service, U.S. Coast Guard, U.S. Department of Housing and Urban Development, U.S. Department of Veterans Affairs – National Cemetery Administration, U.S. Environmental Protection Agency, Wisconsin Department of Natural Resources (WDNR), and Milwaukee Metropolitan Sewerage District. Comments were also received from local officials, interest groups, and the public (see Section 6, Public Involvement and Agency Coordination Following Draft EIS Availability and Public Hearing). Comments varied, and there was support for all alternatives. The following were the most commonly heard comments from the public:

- Support of the At-grade alternative (for various reasons, but cultural resource groups support this alternative because it would have No Adverse Effect on historic properties, specifically the Soldiers' Home NHL and Historic District, as opposed to the Double Deck alternative).
- Maintain existing interchanges.
- Safety improvements on existing footprint.
- Support of a transit-focused alternative.

Section 6, Public Involvement and Agency Coordination Following Draft EIS Availability and Public Hearing, provides information regarding the public hearings and the comments received during the Draft EIS availability period. Section 6.4 summarizes responses to substantive comments related to the project's purpose and need, alternatives analysis, social, economic, or environmental impact analysis, or public involvement received during the Draft EIS availability period.

Other Federal or State Actions Required

WisDOT and FHWA will apply to the Corps of Engineers for a permit to place fill in waters of the United States under Section 404 of the Clean Water Act. WisDOT will also request water quality certification from WDNR under Section 401 of the Clean Water Act. WisDOT will coordinate threatened and endangered species impacts with WDNR under state statute 29.604 and administrative code NR 27. WisDOT coordinated with the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act (ESA) to determine if there are any impact to the northern long eared bat or its habitat. The *User's Guide for the Range-wide Programmatic Informal Consultation for Indiana Bat and Northern Long-eared Bat* addresses the determination and agency consultation process to assess the potential impacts to the northern long-eared bat. Under Section 7 of the ESA, federal agencies

are also required to consult with USFWS to ensure that proposed actions do not jeopardize any listed species or result in destruction or modification of critical habitat.

FHWA and WisDOT are consulting with and obtaining input from the Wisconsin State Historic Preservation Office, National Park Service, Advisory Council on Historic Preservation, U.S. Department of Veterans Affairs, and other consulting parties under Section 106 and Section 110(f) of the National Historic Preservation Act. Section 110(f) of the Act is codified in 54 United States Code (USC) 306107. Regulations Associated with Section 110(f) are at 36 *Code of Federal Regulations* 800.10. WisDOT and FHWA are consulting with officials with jurisdiction over parks (Milwaukee County) and historic properties (State Historic Preservation Office, National Park Service, and Advisory Council on Historic Preservation) as required under the U.S. Department of Transportation's Section 4(f) law (49 USC 303 and 23 USC 138). Coordination under Section 106, Section 110(f) and Section 4(f) must be completed prior to completion of the Record of Decision.

Proposed Mitigation

WisDOT and FHWA will avoid and minimize impacts to the extent practicable. Unavoidable impacts will be mitigated to the extent practicable and allowable under state and federal law. Where there is no practicable alternative to filling wetlands, state and federal regulations require compensatory wetland mitigation in accordance with Section 404 of the Clean Water Act and the *WisDOT/Wisconsin Department of Natural Resources Cooperative Agreement on Compensatory Wetland Mitigation* (WisDOT/WDNR 2012). WisDOT will continue to work with WDNR to determine appropriate mitigation measures, if any, for state threatened or endangered species impacts. Residential and business relocations would follow federal law, which requires just compensation for residences and businesses displaced by a transportation project. WisDOT and FHWA will work with local officials and affected residents to determine the location of noise barriers in areas where the barriers are reasonable, feasible, and likely to be incorporated. See Appendix F.

The Section 106 process will culminate in a Programmatic Agreement that will stipulate the measures that will be imposed to avoid adverse effects to historic properties.

Information about the Final EIS

The Final EIS includes information presented in the Draft EIS, which was approved by FHWA on November 4, 2014, for distribution to cooperating and participating agencies and the public. It responds to comments on the Draft EIS, summarizes input received as a result of the public hearing and availability of the Draft EIS for review, and identifies the preferred alternative. The following is a list of substantive format changes, revisions, and additions between the Draft and Final EIS. New or revised material in the Final EIS is highlighted with shading.

Summary

Updated text as appropriate. Added additional information regarding the alternatives retained for detailed study, environmental impacts, economic impacts, and public involvement. Added discussion of the preferred alternative and summary of major changes made in each section off the document.

Section 1—Purpose and Need for the Project

Minor updates. Updated discussion of SEWRPC's 2035 regional transportation plan to account for September 2015 regional transportation plan amendment to include a half interchange at Hawley Road and replace the existing Mitchell Boulevard interchange with a new local road interchange within the Stadium Interchange. Updated Transportation Improvement Program (TIP) discussion for 2015-2018 TIP. Revised number of crashes in the I-94 East-West Corridor to account for crashes between 25th Street and 16th Street and added a text box to discuss how WisDOT calculates crash rates.

Section 2—Alternatives Considered/Preferred Alternative

- Previously titled "Alternatives Considered" in the Draft EIS.

- Discussion of the Alternatives Retained for Detailed Study was updated to reflect greater detail for the alternatives and minor design refinements that occurred after the Draft EIS was completed.
- Updated information on how the alternatives retained for detailed study meet purpose and need factors. Substantive updates include updated safety information for all alternatives, more detailed design information, and discussion of how the At-grade alternative with half interchange at Hawley Road option meets the purpose and need element of providing a level of service D or greater in the design year (2040).
- Updated discussion noting that additional design and analysis since the Draft EIS has led to a determination that, when considering all factors, the At-grade alternative with half interchange at Hawley Road, sufficiently meets the project purpose and need.
- Discussion of the preferred alternative and the basis for identification has been added as Section 2.3, Identification of Preferred Alternative. This subsection also contains a description of improvements required at three local road interchanges and the extension of Washington Street to mitigate for additional traffic on local roads as a result of the half interchange at Hawley Road.
- Added new Section 2.7, Public and Agency Input during Comment Period, to summarize substantive comments received during the comment period regarding project alternatives.

Section 3—Existing Conditions, Environmental Impacts, and Measures to Mitigate Adverse Impacts

Several sections have been updated. Updates were made to some sections as a result of the refined design of the alternatives retained for detailed study. Appropriate sections were updated to account for the Washington Street extension and other local road improvements that will be constructed as part of this project. Although a preferred alternative has been identified, the impact analysis of all alternatives retained for detailed evaluation remains in Section 3. Key updates include the following:

- The Highway Traffic and Operational Characteristics impact section (Section 3.3.2.3) was revised to account for updated design year (2040) level of service information.
- The Safety Impacts section (Section 3.3.2.4) was revised to account for the updated ISATe⁷ predictive safety analysis.
- The Bicycle/Pedestrian Impacts section (Section 3.3.2.6) was revised to account for Wisconsin State Statute 84.01(35) noting that WisDOT shall give due consideration to establishing bikeways and pedestrian ways in highway reconstruction projects. **Table 3-7** was added to show locations along the I-94 East-West Corridor where bicycle and pedestrian facilities exist or do not exist currently and if these facilities will be provided as part of the preferred alternative. The table also notes any constraints to providing full bicycle and pedestrian access as part of the preferred alternative.
- Major revisions of Section 3.8, Socioeconomic Characteristics, and Section 3.9, Environmental Justice, to provide greater detail on potential impacts and benefits to environmental justice populations. The I-94 East-West Corridor project would not result in disproportionately high and adverse effects on minority and/or low-income populations under Executive Order 12898, DOT Order 5610.2(a), and the FHWA Order 6640.23A.
- The Threatened and Endangered Species section (Section 3.18) was updated address that, as of May 4, 2015, the northern long-eared bat (*Myotis septentrionalis*) is listed as threatened under the Endangered Species Act by the U.S. Fish and Wildlife Service. The entire state of Wisconsin is considered within the range of the northern long-eared bat, and thus, must be taken into account as part of the I-94 East-West Corridor project.

⁷ The Interchange Safety Analysis Tool-enhanced (ISATe) is an FHWA-approved spreadsheet-based tool that analyzes crash frequency and crash severity along freeways and interchanges. It estimates the frequency of crashes based on actual crash frequencies on over 50 freeway segments around the country. ISATe estimates the number of crashes based on traffic volume, horizontal alignment (that is, curves), lane and shoulder width, length of deceleration and acceleration lanes, and weaving lengths. ISATe is not capable of estimating crashes based on vertical alignment (that is, steepness of grades, or hills).

Evaluation of the proposed project has indicated that the project may affect, but is not likely to adversely affect the northern long-eared bat.

- Updated the noise impacts (Section 3.19) to account for design refinements.
- Updated Air Quality section (Section 3.20) to account for revised 8-hour National Ambient Air Quality Standards (NAAQS) for ground-level ozone and the updated USDOT conformity determination.
- Updated construction costs (Section 3.27.1) to account for Cost Estimate Review to determine current year (2014) construction costs and estimated inflated costs in the year of expenditure.

Section 4—Final Section 4(f) Evaluation

Previously titled “Draft Section 4 (f) Evaluation.” This section has been updated to reflect the preferred alternative. The preferred alternative would result in no more than *de minimis* impacts of any Section 4(f) properties.

Section 4 also reflects continued coordination with the Section 106 consulting parties and agency comments during the Draft EIS comment period. Discussion of the proposed action was updated to reflect the design refinements noted in Section 2.

Section 5—Public Involvement and Agency Coordination during Draft EIS Preparation Prior to Draft EIS Availability

Previously titled “Public Involvement and Agency Coordination.” In Section 5.1.6, Other Public Outreach Activities, meetings with groups representing minority and/or low-income populations were highlighted.

Section 6—Public Involvement and Agency Coordination Following Draft EIS Availability and Public Hearing

New Final EIS Section.

Appendix A—Alternatives Considered and Dismissed

No changes.

Appendix B—Traffic Noise Impact and Acoustical Mitigation Summary

Updated to account for local road improvements, as well as design refinements that occurred since the Draft EIS was completed. Added acoustical mitigation tables from body of the EIS to this appendix for those alternatives carried forward for detailed study that were not identified as the preferred alternative.

Appendix C—Mobile Source Air Toxics

Minor updates.

Appendix D—Agency Coordination Prior to Draft EIS

No changes.

Appendix E—Agency Coordination following Draft EIS Availability

New Final EIS appendix.

Appendix F—Summary of Mitigation Measures

Was Appendix E in Draft EIS. Updated where applicable.

Appendix G—Summary of Potential Impacts and Mitigation for I-94 East-West

New Final EIS appendix.

TABLE S-1
Impact Summary Table

		8 lane Modernization Alternatives					Preferred Alternative At grade; half Hawley Rd interchange; On alignment; off interstate improvements
		West Segment			East Segment		
Impact	No build	At grade (No Hawley Rd interchange)	At grade (Half Hawley Rd interchange)	Double Deck	On alignment	Off alignment	
Total Cost (2014 dollars in millions)	\$0	\$115 ^a	\$125 ^a	\$295 to \$345 ^b	\$710 to \$735 ^c	\$785 to \$810 ^c	\$852 ^k (\$1.106 billion YOE)
New Right-of-Way (acres) ^d	0	20 ^e	22 ^e	13	51	53	73
Residential Displacements (housing units)	0	4	5	10	3	3	8
Commercial Displacements	0	1	2	2	8 ^f	6 ^f	10 ^f
Institutional Displacements	0	1 ^g	1 ^g	0	0	0	1 ^g
100-year Floodplain Crossings (no new crossings)	1	0	0	0	1	1	1
Floodplain (acres)	0	0	0	0	0	0	0
Stream Crossings (no new crossings)	1	0	0	0	1	1	1
Wetland (acres)	0	0.5	0.5	0	0.1	0.1	0.6
Parkland (acres)	0	0	0	0	0	0	0
Threatened and Endangered Species (Yes/No)	No	No	No	No	Yes	Yes	Yes
Primary Environmental Corridor (acres)	0	0	0	0	0	0	0
Adverse Effects to Historic Properties	0	0	0	4 ^h	0	0	0
Archaeological Sites Affected	0	0	0	0	0	0	0
Environmental Justice Issues (Yes/No)	No	No	No	No	No	No	No
Air Quality Permit	No	No	No	No	No	No	No
Noise Receptors Impacted (Design Year 2040)	0	130 ⁱ	116 ⁱ	98/110 ^j	61	83	177 ⁱ
Potential Contaminated Sites (sites recommended for additional field testing)	0	21	20	3	38	47	39

^a Does not include off-interstate improvement costs.^b The all up option is estimated to cost \$295 million and the partially down option \$320 to \$345 million.^c Construction in the Stadium Interchange area of the east segment is about \$25 million greater (2014 dollars) if the Double Deck alternative is selected for the west segment.^d In addition to right-of-way acquisition, easements (not included as part of the right-of-way total in this table) may be required.^e These totals include right-of-way for the At-grade alternatives, plus an additional 13 acres of land needed for the off-interstate improvements.^f There are two additional vacant commercial buildings/parcels that will be acquired (June 2015).^g The WisDOT Southeast Region Service Facility on 60th Street/Hawley Road would be relocated as a result of the Washington Street extension under the At-grade alternative with half interchange at Hawley Road option.^h Historic properties affected are Calvary Cemetery; Northwestern Branch, National Home for Disabled Volunteer Soldiers National Historic Landmark and Historic District; and Story Hill Residential Historic District 2 and 3.ⁱ There are an additional 97 noise receptors impacted as a result of Washington Street extension. This number is not included in these totals.^j There would be 98 noise receptors impacted with the all up option and 110 would be impacted with the partially down option.^k The preferred alternative cost includes the cost of off-interstate improvements and adjustments to the overall cost based on the FHWA Cost Estimate Review session in 2015. The total estimated cost represented known details and project risks as of the date of the Cost Estimate Review. Final committed project costs are determined prior to development of the project's Financial Plan and are validated through a second Cost Estimate Review completed prior to construction.

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Abbreviations and Acronyms

AADT	annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADID	Advanced Identification of Wetland Disposal Areas
AOC	Area of Concern
APE	Area of Potential Effects
ATC	American Transmission Company
BMP	best management practice
BRT	bus rapid transit
C-D	collector-distributor
CAC	Community Advisory Committee
CEQ	Council on Environmental Quality
CFR	<i>Code of Federal Regulations</i>
CH ₄	methane
CMAQ	Congestion Mitigation and Air Quality
CO ₂	carbon dioxide
Corps of Engineers	U.S. Army Corps of Engineers
CSD	community-sensitive design
CSS	community-sensitive solutions
dB	decibel
dBA	decibel A-weighted
DBE	disadvantaged business enterprise
DHV	design hour volume
DPW	Department of Public Works
DTSD	Division of Transportation System Development
EIS	Environmental Impact Statement
ERP	emergency repair program
FDM	Facilities Development Manual

FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FQI	Floristic Quality Index
FS	field site
FTA	Federal Transit Administration
FWS	United States Fish and Wildlife Service
HAST	Hank Aaron State Trail
HCS	Highway Capacity Software
HHS	U.S. Department of Health and Human Services
HOT	high-occupancy toll
HOV	high-occupancy vehicle
I-94	Interstate 94
I-794	Interstate 794
I-894	Interstate 894
ICE	indirect and cumulative effects
ISATe	Interchange Safety Analysis Tool Enhanced
KOP	key observation point
kv	kilovolt
LPA	locally preferred alternative
LUST	leaking underground storage tank
LWCF	Land and Water Conservation Fund
MATC	Milwaukee Area Technical College
MCTS	Milwaukee County Transit System
MIS	major investment study
MMSD	Milwaukee Metropolitan Sewerage District
MOA	Memorandum of Agreement
mph	miles per hour
MPS	Milwaukee Public Schools
MSAT	mobile source air toxics
MVP	Menominee Valley Partners
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places

NBI	National Bridge Inventory
NCHRP	National Cooperative Highway Research Program
NEPA	National Environmental Policy Act
NFPA	National Fire Protection Association
NH ₃	ammonia
NHL	National Historic Landmark
NO ₂	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
PCB	polychlorinated biphenyl
PIM	public involvement meeting
ppb	parts per billion
ppm	parts per million
ROD	Record of Decision
RTA	Regional Transit Authority
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SEWRPC	Southeastern Wisconsin Regional Planning Commission
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SOHI	South of Highland
Stadium District	Southeast Wisconsin Professional Baseball Park District
TAC	Technical Advisory Committee
TDM	transportation demand management
TIA	Traffic Impact Analysis
TIF	tax increment financing
TIN	Target Investment Neighborhood
TIP	Transportation Improvement Program
TMDL	total maximum daily load
TMP	transportation management plan
TNM	Traffic Noise Model®
TSM	transportation system management
TSP	total suspended particles

Uniform Act	Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended
USC	United States Code
U.S. DOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
US 41	U.S. Highway 41
UWM	University of Wisconsin–Milwaukee
VA	United States Department of Veterans Affairs
VIA	visual impact assessment
VMT	vehicle miles traveled
vpd	vehicles per day
WDNR	Wisconsin Department of Natural Resources
WIS	Wisconsin State Highway
WisDOT	Wisconsin Department of Transportation

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Purpose and Need for the Project

1.1 Description of the Project

1.1.1 Location and Termini

The Interstate 94 (I-94) East-West Corridor study is located in central Milwaukee County, Wisconsin, and includes 3.5 miles of I-94 from 70th Street (west terminus) to 16th Street (east terminus). See **Exhibit 1-1**.

At the outset of the I-94 East-West Corridor study, the east terminus for the study was set as 25th Street to match the west limit of the previously constructed Marquette Interchange project. In June 2013, the Wisconsin Department of Transportation (WisDOT) and the Federal Highway Administration (FHWA) determined that the east terminus for the I-94 East-West Corridor study would be extended farther east to accommodate alternatives that would tie back into I-94 near 16th Street, rather than 25th Street. The transition area between the reconstructed west segment of the Marquette Interchange and existing I-94 was 16th Street to 25th Street.

The I-94 east-west freeway is one of the busiest routes in southeastern Wisconsin. It serves as a vital link to downtown Milwaukee and the western suburbs, and is part of a major east-west interstate route serving national, regional, and local traffic for trips within and through the study area.

A **service interchange** connects a freeway to arterial or collector roads. A service interchange has an at-grade intersection with the non-freeway crossroad that has some type of traffic control (stop signs, traffic signals, or yield conditions at roundabout intersections) that may require drivers to either stop or yield to other traffic or pedestrians.



Example of typical urban service interchange (I-43/I-894 at 60th Street)

A **system interchange** connects two or more freeways. The traffic within system interchanges moves freely without stopping.



System interchange example (Marquette Interchange)

The I-94 East-West Corridor contains the following seven interchanges:

- Service interchanges along I-94:
 - 68th Street/70th Street
 - Hawley Road
 - Mitchell Boulevard
 - 35th Street
 - 25th/26th/28th Street
- Service interchange along U.S. Highway 41 (US 41)¹:
 - Bluemound Road/Wisconsin Avenue/Wells Street
- System interchange²:
 - Stadium Interchange (I-94/US 41/Miller Park Way)

At each interchange, the project limit extends north/south until each crossroad ties in to existing alignment. The termini for the study generally matches the termini for two previously completed studies of the southeastern Wisconsin freeway system: the Zoo Interchange study, located west of the I-94 East-West Corridor, and the Marquette Interchange study, located to the east. The east terminus of the Zoo Interchange study serves as the west terminus for the I-94 East-West Corridor study (70th Street). The west terminus of the Marquette Interchange study was 25th Street, and the transition area between the reconstructed west segment of the Marquette Interchange and existing I-94 generally included 16th Street to 25th Street. WisDOT and FHWA extended the east terminus for the I-94 East-West Corridor to 16th Street.

1.1.2 Project History

WisDOT completed building this portion of I-94 in the early 1960's. In 1966, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) completed a regional transportation plan for the year 1990. The original transportation plan recommended several new freeway links, many of which were never constructed. For example, a once-planned outer beltway would have connected I-94 in southern Milwaukee County to I-94 in Waukesha County and to US 41/45 in Washington County. In Milwaukee County, the planned Park West Freeway and Stadium Freeways were never completed. As a result, the existing freeway system now carries more traffic than initially projected.

In 1991, WisDOT began analyzing long-term improvements to the following three I-94 system interchanges in Milwaukee County: the Zoo Interchange, the Stadium Interchange, and the Marquette Interchange. By 1995, the three interchange studies merged into one study, the I-94 East-West Corridor study, which evaluated 10 highway and transit alternatives, including light rail transit and bus options, in the I-94 East-West corridor.

¹ US 41 in the study area has been re-designated as a state highway (WIS 175) due to the conversion of US 41 to I-41 and the rerouting of I-41/US 41 along I-894 and US 45. For the sake of the I-94 East-West Corridor study, the roadway will be called US 41 because the public knows the road by that name. The US 41 Interstate Conversion Project converted US 41 to an interstate highway from the Mitchell Interchange in Milwaukee to Green Bay via I-894, US 45, and US 41. This involves no improvements of the former US 41 route in the I-94 East-West Corridor (other than new signing) and does not change the forecasted traffic volume on the roadways. Project signing was completed in 2015. For more information on the US 41 Interstate Conversion Project, see the project's website at: <http://www.dot.wisconsin.gov/projects/nregion/41/>.

² The current Stadium Interchange was designed and built to function as a system interchange in anticipation of planned freeway development. However, since US 41 (now WIS 175) was never fully developed as a freeway and the route does not function as a freeway for an appreciable distance north and south of the interchange, the interchange is not technically classified as a system interchange by FHWA. Throughout this document, the existing Stadium Interchange is generally referred to as a system interchange. FHWA's classification of the type of interchange, as it pertains to the existing interchange, has no bearing on the proposed design of the updated interchange. The proposed Stadium Interchange design, as part of the preferred alternative, is referred to as a "hybrid" interchange. This term can also be synonymous with a high-level service interchange. Because previous project documentation, including the Draft EIS, referred to the current Stadium Interchange as a system interchange, and the proposed design as a "hybrid" interchange, and since the terminology has no bearing on the proposed design as part of the preferred alternative, the terminology has been retained in the Final EIS.

WisDOT, in collaboration with FHWA and the Federal Transit Administration (FTA), completed a Draft Environmental Impact Statement (Draft EIS)/Major Investment Study (MIS) for the original I-94 East-West Corridor study in October 1996. The Draft EIS/MIS project termini were Interstate 794 (I-794) and the I-94/Wisconsin State Highway 16 (WIS 16) Interchange in Waukesha County. WisDOT developed a draft locally preferred alternative (LPA) that included all the transportation components of the Draft EIS/MIS, such as the following:

- Reconstructing the Marquette Interchange with design and safety improvements
- Reconstructing I-94 to modern design standards between downtown Milwaukee and Waukesha
- Adding special-purpose lanes for carpools and buses on I-94
- Expanding bus transit service in the metro Milwaukee area
- Establishing light-rail transit in Milwaukee County

The Milwaukee County Board accepted the LPA by endorsing further study funded entirely with federal and state funds. The Waukesha County Board supported studying the reconstruction and modernization of I-94, including adding high-occupancy vehicle (HOV) lanes and expanding bus service, but opposed constructing light rail. The Waukesha County Board also supported preliminary engineering, completing the Final EIS, and separating the study of transportation improvements so that each improvement could advance independently. With Milwaukee and Waukesha counties favoring different elements of the draft LPA, local consensus was not possible. As a result, federal agencies ended the study process, and the LPA did not advance to the design phase.

With the development of the draft LPA, the MIS process was completed for the I-94 East-West Corridor in Milwaukee and Waukesha counties. On June 26, 2000, FHWA published a *Federal Register* notice terminating the environmental process at the Draft EIS/MIS phase and announced that WisDOT, FTA, and FHWA would not complete a corridor-wide Final EIS and Record of Decision (ROD). In addition, FHWA indicated that it was unlikely that the various components of the LPA would proceed on the same schedule, but the information from the Draft EIS/MIS could lead to environmental analysis for individual components of the LPA. WisDOT and FHWA have since advanced two elements of the previous LPA: the Marquette Interchange (reconstruction completed in 2008) and the Zoo Interchange (construction began in 2013). The other elements of the LPA have not been implemented.

In 2003, SEWRPC completed a regional freeway system planning study, *A Regional Freeway System Reconstruction Plan for Southeastern Wisconsin*, at the request of WisDOT. The study identified segments of the freeway system that would require reconstruction within the next 30 years and recommended how to rebuild various freeway segments. The study discussed whether the freeway segments should be rebuilt in kind, with minor redesign, with substantial redesign, or with additional traffic lanes. The study recommended reconstructing I-94 with 8 travel lanes (4 in each direction), new pavement with full shoulders, new bridges with additional vertical clearance, improved entrance ramps for better operations, and improved vertical alignment (fewer dips and rises in the road) to accommodate safer stopping sight distances. The study also recommended reconstructing the Stadium Interchange as a service interchange.

In 2006, SEWRPC completed its most recent regional transportation plan, *A Regional Transportation System Plan for Southeastern Wisconsin: 2035—SEWRPC Planning Report No. 49* (SEWRPC 2006a).³ The plan recognizes that 127 miles of freeway widening proposed in the plan, and in particular the 19 miles of widening in the City of Milwaukee (including I-94 between the Zoo and Marquette interchanges), will undergo preliminary engineering and environmental documentation by WisDOT. The plan acknowledged that, during the environmental documentation process, alternatives will be considered, including rebuild-as-is, various options of rebuilding to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. The plan

³ SEWRPC conducted an interim review and update of the regional transportation plan in 2014. SEWRPC has begun work on the 2050 regional land use and transportation plan, which will update the year 2035 plans.

further acknowledges that only at the conclusion of preliminary engineering would WisDOT and FHWA determine how the freeway would be reconstructed (note: this takes place when a ROD is approved). See Section 1.3.1, Land Use and Transportation Planning, for additional information.

In fall 2011, Wisconsin's Transportation Projects Commission approved the I-94 corridor for study. FHWA published a Notice of Intent to prepare an EIS for the I-94 East-West Corridor in the *Federal Register* on May 18, 2012. An updated Notice of Intent was published in the *Federal Register* on August 28, 2013, to reflect the new east terminus (16th Street).

The I-94 East-West Corridor study, described in this EIS, builds upon the previous studies and focuses on I-94 from 70th Street to 16th Street.

1.1.3 Relationship to Other Projects

In the absence of any reconstruction of I-94 pursuant to the MIS and/or 2003 SEWRPC freeway planning recommendations, ongoing maintenance of existing I-94 has continued to address deteriorating pavement conditions. Most recently, WisDOT resurfaced I-94 in the study area in 2011 and 2012, which was the third repaving of this stretch since its construction and is a short-term solution to address deteriorating pavement conditions (see Section 1.3.4.1, Pavement Condition).

WisDOT is in the process of reconstructing the Zoo interchange (I-41, I-94, I-894, and US 45) to address the obsolete design of roadway and bridges, current and future traffic capacity, and safety. Construction of the Zoo Interchange project began in 2013 and includes reconstructing the freeway and bridges, modifying interchange access to improve safety and traffic flow, and reconstructing local streets affected by the freeway reconstruction. It is anticipated that construction of the Zoo Interchange project elements adjacent to I-94 will be finished in 2018. Construction of the north segment of the Zoo Interchange project (Watertown Plank Road to Burleigh Street) is anticipated to be completed in 2019-2020 or beyond. As noted previously, the I-94 East-West Corridor study connects the Zoo Interchange project with the completed Marquette Interchange project.

The following recently completed or ongoing studies and projects are located near the I-94 East-West Corridor:

- Addressing congestion on westbound I-794 through the Marquette Interchange (reduced from 2 lanes to 1 lane in spring 2012) and westbound I-94 as it exits the Marquette Interchange by adding an auxiliary lane from 25th Street to 37th Street. WisDOT completed this project in 2013.
- Converting US 41 and US 45 to an interstate highway (I-41) from the Mitchell Interchange in Milwaukee to Green Bay via I-894, US 45, and US 41 in 2015. This involves no improvements to US 41 in the I-94 East-West Corridor (other than additional signing) and does not change the forecasted traffic volumes on the roadways.
- Resurfacing I-794 from the Milwaukee River to Carferry Drive and replacing the concrete deck on the Hoan Bridge beginning in 2013.
- Reconfiguring the Lake Interchange (I-794 from the Marquette Interchange to the Hoan Bridge) as a part of the Milwaukee Lakefront Gateway Project in 2015–2016.
- Resurfacing US 41 between the Stadium Interchange and State Street in 2014.
- Rehabilitating I-94/I-43 bridges between the Marquette Interchange and Mitchell Interchange beginning in 2013.
- A corridor study of I-43 from Silver Spring Drive in Milwaukee County to WIS 60 in Ozaukee County was recently completed. Approval of the Final EIS and ROD occurred in November 2014.
- Adding an auxiliary lane on both eastbound and westbound I-94 between Moorland Road and the Highway 100 ramps and replacing two bridges in this corridor. Construction is anticipated in 2016 and 2017.

- A bus rapid transit (BRT) transit study is being undertaken by Milwaukee County to explore the development of BRT along a corridor paralleling I-94 between downtown Milwaukee and the Milwaukee Regional Medical Center. WisDOT has committed to financially participate in the planning process of this BRT study.

1.2 Purpose of this Project

The I-94 East-West Corridor project would accomplish the following:

- Maintain a key link in the local, state, and national transportation network. Sections 1.3.1, Land Use and Transportation Planning, and 1.3.2, System Linkage and Route Importance, describe the project in the context of the regional transportation planning process and the role of I-94 in the local, regional, and national transportation network.
- Address the obsolete design of I-94 to improve safety and decrease crashes. Section 1.3.3 describes the crash history in the corridor, and Section 1.3.4 describes outdated design aspects in the study corridor.
- Replace deteriorating pavement. Section 1.3.4.1 describes the poor condition of the pavement on I-94. Most of the original pavement from the 1960s construction is still in place. Although there have been three pavement overlays, each has a shorter life span than the previous overlay. Section 1.3.4.2 describes the condition of the bridges in the study area.
- Accommodate existing and future traffic volumes at an acceptable level of service. Section 1.3.5 describes current congestion on I-94 during the morning and afternoon rush hours and how congestion will worsen in the future.

The purpose of the I-94 East-West Corridor study project is to address the deteriorated condition of I-94, obsolete roadway and bridge design, existing and future traffic demand, and high crash rates.

The project would neither require nor preclude other future transportation improvements identified in the regional transportation plan. The project would provide a safer and more efficient transportation system in the I-94 East-West Corridor while minimizing impacts to the natural, cultural, and built environment to the extent feasible and practicable.

1.3 Need for the Project

A combination of factors, including the following, demonstrates the transportation improvement need in the I-94 East-West Corridor:

- Regional land use and transportation planning
- System linkage and route importance
- High crash rates
- Existing freeway conditions and deficiencies
- Existing and future traffic volumes

The remainder of Section 1.3 discusses these factors in more detail. The need for improvements sets the stage for developing and evaluating possible improvement alternatives.

1.3.1 Land Use and Transportation Planning

SEWRPC, created by state statute in 1960, is the official planning agency for southeastern Wisconsin, which includes Kenosha, Milwaukee, Ozaukee, Racine, Walworth, Washington, and Waukesha counties.

SEWRPC's principal responsibility is to prepare an advisory comprehensive plan for the physical development of the region, including a regional land use plan, which is the basis of all other plan elements, including transportation. SEWRPC conducts regional planning under the guidance of various technical coordinating and advisory committees with representatives from state and federal agencies; local planning, transportation, and public works departments; transit providers and service groups; private utilities; and

environmental organizations. Implementing plan recommendations, including the determination as to if and how they are implemented, and determining the degree of implementation is the responsibility of local, state, or federal governments based on additional planning, programming, and engineering/environmental studies, such as those conducted by WisDOT.

The following is a summary of adopted regional plans relevant to the I-94 East-West Corridor.

2035 Regional Land Use Plan for Southeastern Wisconsin—SEWRPC Planning Report No. 48 (SEWRPC 2006b)

The first regional land use plan was adopted in 1966 with updates adopted in 1977, 1992, 1997, and 2006 (current plan). The land use plan is based on an extensive database and inventory of the region's physical characteristics and has been maintained and updated by SEWRPC for more than 40 years. Physical characteristics pertinent to transportation demand⁴ include existing and future land use, growth and development trends/locations, and housing and employment trends. The 2035 regional land use plan is also based on an *intermediate growth scenario*⁵ that recommends the following:

- Seek a centralized regional settlement pattern that moderates the current trend toward decentralized land development.
- Stabilize and revitalize urban centers, particularly the Milwaukee urbanized area.
- Encourage new development as infill in existing urban centers with defined growth emanating outward from the existing urban centers.
- Plan new urban development at densities that effectively support essential urban services, including water, sewer, and public transit.
- Protect remaining primary environmental corridors from incompatible urban development, discourage urban development in secondary environmental corridors, and preserve prime agricultural lands.

Table 1-1 presents growth projections for Milwaukee County based on an intermediate growth scenario. SEWRPC uses population, household, employment, and urban land use projections, along with other factors, to assist in developing its year 2035 traffic forecast. SEWRPC projects that vehicle miles traveled (VMT) will increase by 16 percent between 2001 and 2035, which is equivalent to a 0.4 percent annual increase. VMT is an output of SEWRPC's regional travel demand model. It is used as one check of the model's accuracy. SEWRPC reviewed its 2035 traffic forecast in 2010 (SEWRPC 2010a) and again in 2014 (*Memorandum Report No. 215, Review and Update of the Year 2035 Regional Transportation Plan*) and determined that it remains valid for long-range transportation planning (SEWRPC 2014a). The 2040 traffic forecast used for this I-94 East-West Corridor study is based on SEWRPC's 2035 traffic forecast. The SEWRPC 2035 travel forecast takes into account recent and planned development in or near the study area. SEWRPC projected its 2035 forecast to 2040 based on the same annual growth rate used for the 2030 to 2035 timeframe (0.4 percent annually). See the technical memorandum titled *Travel Forecasting Methodology for I-94 East-West Corridor Study*, located on the CD at the back of the document, for more information on how WisDOT uses SEWRPC's traffic forecast to assess future traffic conditions for this study.

⁴ *Transportation Demand* refers to the amount and type of travel people would choose under specific conditions, taking into account factors such as the quality of transport options available and their prices.

⁵ SEWRPC projected regional population using three growth scenarios: high, intermediate, and low. The intermediate population growth scenario is considered the most likely to be achieved, while high population and low population growth scenarios are intended to identify a plausible range for population growth.

TABLE 1-1

Milwaukee County Growth Projections from 2035 Regional Land Use and Transportation Plans⁶

Growth Indicators	Percent Increase (2000–2035)
Population ^a	7.1
Households ^a	13.2
Employment ^a	<0.1
Urban Land Use ^a	5.2
Vehicles Miles Traveled ^b	16.0

^a Source: SEWRPC 2006b. *2035 Regional Land Use Plan for Southeastern Wisconsin—SEWRPC Planning Report No. 48*. June. (Tables 28, 30, 31, and 35). Percent increase for population, households, and employment for years 2000 to 2035.

^b Source: SEWRPC 2006a. *A Regional Transportation System Plan for Southeastern Wisconsin: 2035—SEWRPC Planning Report No. 49*. (Table 107). Data are for arterial and highway systems under no-build scenario evaluated in the 2035 regional transportation plan for years 2001 to 2035.

A Regional Transportation System Plan for Southeastern Wisconsin: 2035—SEWRPC Planning Report No. 49 (SEWRPC 2006a)

Similar to the land use plan, SEWRPC adopted the first regional transportation plan in 1966, with updates adopted in 1978, 1994, 1997, and 2006 (current plan, reviewed and updated in 2010 and 2014). Based on population, household, employment growth, and other data from the regional land use plan, the transportation plan forecasts traffic growth and transportation demand in the region. It also analyzes the ability of existing transportation facilities to address forecasted traffic demand and meet air-quality conformity requirements. SEWRPC's regional traffic model has been in place for more than 40 years and determines future traffic demand. SEWRPC updates the model regularly⁷ to reflect changing trends. A transportation project must be listed in the regional transportation plan before it can be constructed. However, inclusion in the plan does not mean the project will ultimately be constructed.

Traffic forecasts reflect predicted growth patterns, number and types of trips made, routes taken, travel times, and other factors such as transit use. In its recommendations for providing additional highway capacity, the regional transportation plan recommends the following actions occur by 2035:

- An intermediate growth scenario for the region and community land use planning that promotes compact development/redevelopment in areas that can use existing or expanded municipal sewer and water, and where higher-density development can be served by transit, bicycle, and pedestrian facilities.
- A 100 percent increase in public transit in terms of revenue-transit vehicle miles. The increase in public transit includes the development of rapid and express transit systems and substantial expansion of local bus systems where development density is sufficient to generate ridership. SEWRPC's 2014 review and update to the 2035 plan notes a 7 percent decrease in fixed-route bus service since SEWRPC developed the regional transportation plan in 2006. The 2014 review and update suggests that without an increase in funding, the decline in transit may be expected to continue.
- Reducing auto travel and improving efficiency of existing roadways before increasing highway capacity.

⁶ In 2013, SEWRPC updated and extended its population and economic forecasts for the region to a new forecast year. The forecasts were prepared for the 40-year period from 2010 to 2050. Between 2010 and 2050, the projected population of Milwaukee County is anticipated to increase by 9.6 percent under an intermediate growth projection, and the number of households is expected to increase by 13.5 percent. Under the intermediate growth projection, the number of jobs in Milwaukee County is anticipated to increase 5.8 percent between 2010 and 2050.

⁷ SEWRPC's existing base model was developed in 2001 and is continually updated to reflect new developments or anticipated roadway projects. Chapter VI of SEWRPC's 2035 regional transportation plan provides detailed information regarding SEWRPC's travel simulation model and its contents.

- Traffic flow and safety improvements on highways and arterial streets through measures such as intersection improvements and access management strategies before committing to increasing highway capacity.

The regional transportation plan identifies the traffic volumes and congestion that will remain even if implementation of the above actions occurs. SEWRPC's 2014 review and update to the 2035 regional transportation plan includes 2011 congestion data. SEWRPC estimated⁸ the increase in congestion that occurred on the southeastern Wisconsin freeway system between 1972 and 2005. Over the 33 years analyzed, the number of freeway miles affected by congestion increased eightfold (**Exhibit 1-2**).

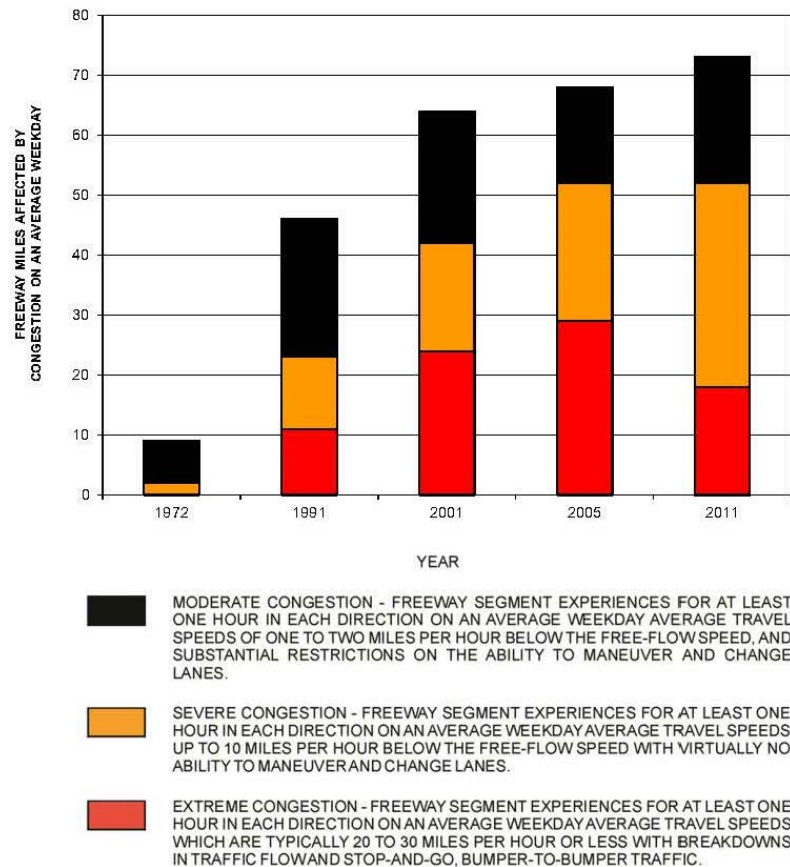
The regional transportation plan evaluates street and highway capacity expansion (freeway and surface arterial) and makes recommendations to address the residual traffic volumes and congestion. Based on SEWRPC's 2014 review and update to the 2035 regional transportation plan, the arterial street and highway element of the regional transportation plan totals 3,662 route-miles. Approximately 89 percent, or 3,373 of these route-miles, were recommended to be resurfaced and reconstructed to their same capacity. Approximately 311 route-miles, or 9 percent of the total recommended year 2035 arterial street and highway system, were recommended for widening upon reconstruction to provide additional through-traffic lanes. The remaining 78 route-miles, or about 2 percent of the total arterial street mileage, were proposed new arterial roads. Thus, the plan proposes about an 11 percent expansion of freeway and surface arterial capacity over the next 20 years and an increase of 9 percent in terms of lane-miles.

The 2035 regional transportation plan includes the following recommendations for the I-94 East-West Corridor:

- Expand I-94 from 6 to 8 travel lanes (4 lanes in each direction) through the entire study area.
- Resurface or reconstruct US 41 with no additional capacity.

EXHIBIT 1-2

Estimated Existing Southeastern Wisconsin Freeway System Traffic Congestion on an Average Weekday



⁸ SEWRPC estimated freeway-system traffic congestion by reviewing freeway hourly average traffic speeds, average traffic densities, and traffic volumes by segment of the freeway system for each hour of an average weekday in 2001. Historical congestion was estimated because congestion data was not gathered at that time, and SEWRPC used historical records to estimate past levels of congestion.

The 2035 regional transportation plan included a full interchange at Hawley Road and did not reflect the relocation of the access provided by the existing Mitchell Boulevard interchange to a new location within the Stadium Interchange. On September 16, 2015, the SEWRPC Commission amended the 2035 regional transportation plan as follows:

- Convert from full to half interchange at Hawley Road.
- Remove existing interchange at Mitchell Boulevard.
- Provide service ramps to non-arterial roadways at the Stadium Interchange.

The 2035 regional transportation plan recognizes that 127 miles of freeway widening proposed in the plan, and in particular the 19 miles of widening in the City of Milwaukee (including I-94 between the Zoo and Marquette interchanges), will undergo preliminary engineering and environmental documentation by WisDOT. The plan acknowledged that during preliminary engineering, alternatives will be considered, including rebuild-as-is, various options of rebuilding to modern design standards, compromises to rebuilding to modern design standards, rebuilding with additional lanes, and rebuilding with the existing number of lanes. The plan further acknowledges that only at the conclusion of preliminary engineering would WisDOT and FHWA determine how the freeway would be reconstructed.

Because the plan defers to more detailed study by WisDOT and FHWA regarding capacity expansion on this segment of I-94 (and other segments), consistency with the regional plan is not a factor used to evaluate alternatives described in Section 2 of this EIS. Nonetheless, the regional plan recommendations demonstrate the need for the project and are an important factor in developing alternatives.

The 2035 regional transportation plan incorporates the findings of SEWRPC's 2003 *A Regional Freeway System Reconstruction Plan for Southeastern Wisconsin* (SEWRPC 2003). The 2003 regional freeway system plan includes the following traffic operations information for the I-94 East-West Corridor:

- This study area does not serve substantial through-vehicle travel. SEWRPC defines through-vehicle travel as travel with neither end of the vehicle trip located within the county within which the freeway segment is located (Milwaukee County). SEWRPC's 2020 traffic projections show the I-94 East-West Corridor as carrying modest volumes of through traffic.
- This segment of I-94 serves substantial inter-county traffic. SEWRPC defines inter-county traffic as travel with one end of the vehicle trip located within the county within which the freeway segment is located.
- The segment of I-94 potentially needs additional freeway traffic lanes.

Based, in part, on the traffic operations information, the 2003 regional freeway system plan includes the following conceptual improvement recommendations for the I-94 East-West Corridor:

- Reconstruct I-94 with considerations for the following: expand from 6 to 8 travel lanes, new pavement with full shoulders, new bridges with additional vertical clearance, improve entrance ramps for better operations, and improve vertical alignment (fewer dips and rises in the road) to accommodate safer stopping sight distances.
- Reconstruct I-94/US 41/Miller Park Way Interchange (Stadium Interchange) as a service interchange.
- Add auxiliary lanes between interchanges.
- Reconstruct Mitchell Boulevard interchange to a modified half diamond.
- Improve the US 41/Bluemound Road/Wisconsin Avenue/Wells Street interchange so that right turns are free-flow movements and left turns are controlled by single-point signals. Reconstruct US 41 largely as-is.

2015–2018 Transportation Improvement Program for Southeastern Wisconsin (November 2014) (SEWRPC 2014b)

SEWRPC is the federally designated metropolitan planning organization that ensures air quality conformity in the seven-county southeastern Wisconsin region. In accordance with the 1990 Clean Air Act Amendments,

proposed highway improvements must be included in an approved Transportation Improvement Program (TIP) and the adopted regional transportation plan to be in conformance with the State Implementation Plan (SIP) for air quality.

The TIP lists all arterial highway, public transit, and other transportation improvement projects proposed to be carried out by state and local governments over a 4-year period in the 7-county region. The TIP indicates the transportation-system improvement priorities of state and local governments in southeastern Wisconsin by their programming of projects to be undertaken in each of the next 4 years. Transit, arterial highway, and other improvement projects to be implemented in the next 4 years with U.S. Department of Transportation (U.S. DOT) funding should be included in the TIP.

The next phase of the I-94 East-West Corridor project is not included in the 2015-2018 TIP because funding has not yet been allocated to the project for this biennium. Funding for final design activities is being pursued and will be obtained, with inclusion in the TIP, prior to the signing of the project's ROD. The ROD is currently scheduled for spring 2016. Preliminary engineering for the I-94 East-West Corridor was included in the 2013–2016 TIP as Project Number 18: "Preliminary Engineering for Reconstruction of I-94 from 70th Street to 25th Street in the City of Milwaukee." In October 2013, SEWRPC amended the 2013-2016 TIP to reflect the updated eastern limit of the project at 16th Street, rather than 25th Street.

The Wisconsin Department of Natural Resources (WDNR) is the state agency responsible for developing the SIP. The SIP documents how WDNR intends to meet its obligations to protect and enhance air quality statewide. The SIP consists of many parts, each requiring approval by the U.S. Environmental Protection Agency (USEPA). Prior to USEPA approval, there must be a public availability period and public hearing. Most parts of the SIP apply to all sources of air pollution in Wisconsin, while some "source-specific" parts of the SIP may apply only to a single regulated entity.

In September 2015, FHWA and the FTA determined SEWRPC's 2035 *Regional Transportation Plan*¹⁰ to be in conformance with the transportation planning requirements of Titles 23 and 49 United States Code (USC), the Clean Air Act Amendments, and related regulation. FHWA and FTA also approved the regional emissions analysis prepared for the 2035 regional transportation plan, which the 2015–2018 TIP serves to implement. The September 15, 2015 USDOT conformity determination is located on the CD at the back of the document. Concurrence on this determination from the USEPA, FHWA, FTA and WDNR is located in Appendix E, pages E-12, E-13, E-14, and E-17.

U.S. Department of Transportation's Bicycle and Pedestrian Accommodation Policy

The *United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations* (U.S. DOT, 2010), signed on March 11, 2010 and announced on March 15, 2010, notes the establishment of well-connected walking and bicycling networks is an important component for livable communities and their design should be a part of federal-aid project developments, such as the I-94 East-West Corridor project. Additionally, FHWA provides guidance, *FHWA Guidance: Bicycle and Pedestrian Provisions of Federal Transportation Legislation* (FHWA, 2015), updated in September 2015, to describe Federal legislative and policy direction related to safety and accommodation for bicycling and walking. Accordingly, transportation agencies should plan, fund, and implement improvements to their walking and bicycling networks, including linkages to transit. Design standards are included in the American Association of State Highway and Transportation Officials (AASHTO) design manuals.

I-94 and the system and service interchange ramps in the study area are exempt from U.S. DOT's bicycle and pedestrian accommodation policy because bicycles and pedestrians are prohibited on these roadways per

¹⁰ As amended in September 2015 to account for proposed changes in access at the current I-94 interchanges at Hawley Road and Mitchell Boulevard as part of the recommended alternative for the I-94 East-West Corridor and updated by SEWRPC Memorandum Report Number 215, *Review and Update of the Year 2035 Regional Transportation Plan* in 2014, and *Year 2015–2018 Transportation Improvement Program*.

WisDOT requirements. However, any local roadways reconstructed as part of the project would be subject to U.S. DOT's bicycle and pedestrian accommodation policy.

Although bicycle and pedestrian accommodations are not part of the project purpose and need, per Wisconsin State Statute 84.01(35), WisDOT shall give due consideration to pedestrian and bicycle facilities, where practicable and consistent with U.S. DOT policy, as part of the alternatives development process discussed in Section 2 of the EIS. Considerations for bike and pedestrian accommodations are included as part of reconstruction activities at cross streets, interchanges, overpasses, and underpasses along the study corridor. See Sections 2.3 and 3.3.2.6 for additional information regarding bicycle and pedestrian accommodations.

1.3.2 System Linkage and Route Importance

I-94 is a major east-west freeway link across the northern United States, connecting Detroit, Chicago, Milwaukee, Madison, St. Paul, Minneapolis, and Billings, Montana.

I-94 is part of the National System of Interstate and Defense Highways. According to AASHTO's *A Policy on Design Standards Interstate System* (2005), "The National System of Interstate and Defense Highways is the most important in the United States. It carries more traffic per kilometer (mile) than any other comparable national system and includes the roads of greatest significance to the economic welfare and defense of the nation. The highways of this system must be designed in keeping with their importance as the backbone of the nation's highway systems. To this end, they must be designed to ensure safety, permanence, utility, and flexibility to provide for predicted traffic growth." In 2013, prior to the conversion of US 41 to I-41, Wisconsin's interstate system (including the southeastern Wisconsin freeway system) composed less than 1 percent of the state roadway miles, yet carried 18 percent of all vehicle miles traveled (WisDOT 2014).

I-94 is also a designated federal and state "long truck route," allowing longer commercial vehicles to use the freeway. I-94 is also a designated "backbone" route in WisDOT's *Connections 2030 Long-Range Multimodal Transportation Plan* (WisDOT 2009). Backbone routes are high-level multilane (or planned multilane) divided highways that provide connections between major statewide regions and economic centers and tie them to the national transportation network.

I-94 serves travelers within the project area, those traveling to and from the project area, and those traveling through the project area. A 2012 peak hour traffic study (Skycomp 2012) shows that 33 percent of trips on I-94 in the I-94 East-West Corridor were trips that started and ended within the project limits (70th Street to 16th Street). That is, trips where the vehicle entered I-94 somewhere within the project limits and the same vehicle exited I-94 within the project limits. The study also determined that 24 percent of the trips on I-94 originated from within the project limits and traveled beyond the project limits, while 19 percent of trips on I-94 originated outside the project limits and ended within the project limits. Finally, 24 percent of travelers were merely moving through the study area (that is, trips began and ended outside of the project limits). This implies that a substantial majority (76 percent) of travelers during peak hours began or ended (or both) their freeway trips in the study corridor.

The I-94 East-West Corridor is the critical link between the Marquette and Zoo interchanges, effectively connecting Milwaukee County's eastern and western freeway systems. In addition to serving long-distance travelers and regional and national freight movement, the study area freeway system is an important commuter route for many of the approximately 575,000 employees who work in Milwaukee County. The I-94 East-West Corridor is adjacent to, or provides a connection to, the following local destinations (**Exhibit 1-3**):

- Downtown Milwaukee
- Downtown West Allis
- Port of Milwaukee
- Potawatomi Hotel and Casino

- Menomonee Valley Industrial Park
- Veterans Affairs (VA) campus, including the Northwestern Branch, National Home for Disabled Volunteer Soldiers National Historic Landmark (NHL) and Clement J. Zablocki VA Medical Center
- MillerCoors Brewing Company
- Summit Place Office Complex
- Miller Park
- Marquette University
- State Fair Park (Petit National Ice Center, Milwaukee Mile, and Exposition Center)
- Milwaukee County Zoo
- Milwaukee County Research Park
- Milwaukee Regional Medical Center

There are over 21,000 businesses with nearly 310,000 jobs, as well as 540,000 people residing within a 5-mile radius of the Stadium Interchange (Paetsch 2013).

1.3.3 High Crash Rates

WisDOT measures highway safety by the frequency and severity of crashes and maintains a database of crashes that occur on the state highway system. WisDOT uses the information to develop statewide average crash rates for highways. WisDOT and FHWA used Wisconsin statewide averages for large urban freeways as the basis to evaluate the I-94 East-West Corridor. Crash rates are expressed as crashes per 100 million VMT and include all reported crashes that cause a fatality, injury, or property damage.

From 2005 to 2009,¹¹ the average statewide large urban freeway crash rate was 85 crashes per 100 million VMT. This rate does not include deer-related crashes. **Table 1-2** and **Exhibit 1-4** summarize the crash rates for I-94, US 41, and Miller Park Way in the study area compared to the statewide average for similar roadways. Most crash rates in the I-94 East-West Corridor are at least 2 to 3 times higher than the statewide average, and several sections are more than 4 times higher than the statewide average. The following are the only two sections of the study area with crash rates below the statewide average:

- Westbound I-94 between the 28th Street entrance and 35th Street exit
- Southbound US 41 between the Wells Street/Wisconsin Avenue exit ramp and Wells Street/Wisconsin Avenue entrance ramp

Crash rates for system and service interchange¹² ramps were not included in **Table 1-2**. Crash rates for ramps are typically calculated based on crashes per 1 million entering vehicles, rather than the crash rate for mainline freeways, which is calculated as crashes per 100 million VMT. Calculating ramp crash rates using the distance of the ramp skews the crash rate because most system and service ramps are short in comparison to the freeway mainline. In addition, system ramp characteristics (speeds, curves) differ greatly from a typical freeway mainline segment.

¹¹ The crash rates used for this project are based on crashes from 2005 through 2009. More recent data are not included due to changes in I-94 East-West Corridor traffic volumes from the Zoo Interchange emergency bridge repair work in 2010, the resurfacing of I-94 in 2011 and 2012, and the restriping of I-94 from the Marquette Interchange to the Stadium Interchange in 2013.

¹² Service interchange ramp crashes do not include those crashes that occur within the ramp terminal intersection area of influence.

TABLE 1-2
High Crash Rate Locations

Crash Rate	Applicable Area
2 to 3 times higher than the statewide average	Eastbound I-94 between 70 th Street exit ramp and 68 th Street entrance ramp
	Eastbound I-94 between Hawley Road exit and entrance ramps
	Westbound I-94 between 16 th Street and 28 th Street entrance ramp
	Westbound I-94 between 35 th Street exit and entrance ramps
	Westbound I-94 between Mitchell Boulevard exit and entrance ramps
	Westbound I-94 between Hawley Road exit and entrance ramps
	Westbound I-94 between 68 th Street exit ramp and 70 th Street entrance ramp
	Northbound Miller Park Way between Frederick Miller Way/Canal Street entrance ramp and Stadium Interchange
	Northbound US 41 between Stadium Interchange and Wisconsin Avenue/Wells Street exit ramp
	Southbound US 41 between Wisconsin Avenue/Wells Street entrance ramp and Stadium Interchange
3 to 4 times higher than the statewide average	Eastbound I-94 between Stadium Interchange and 35 th Street exit ramp
	Eastbound I-94 between 35 th Street exit and entrance ramps
	Eastbound I-94 between 25 th Street entrance ramp and 16 th Street
	Westbound I-94 between 35 th Street entrance ramp and Stadium Interchange
Over 4 times higher than the statewide average	Eastbound I-94 between Mitchell Boulevard exit ramp and Stadium Interchange
	Eastbound I-94 between 26 th Street exit ramp and 25 th Street entrance ramp
	Northbound Miller Park Way between Frederick Miller Way/Canal Street exit and entrance ramps

Note: Statewide crash rate for a “large urban freeway” is 85 crashes per 100 million VMT.

On the I-94 East-West Corridor (I-94 from 70th Street to 16th Street; US 41 north to Wells Street; Miller Park Way south to Frederick Miller Way/Canal Street; Stadium Interchange system ramps; and service interchange ramps), there were 2,637 crashes¹³ (not including deer or other animal crashes) from 2005 to 2009, or roughly 1.4 crashes per day. Approximately 29 percent of the crashes resulted in injuries, and 3 crashes were fatal.

On the study area freeway system and entrance/exit ramps, the following are the most common types of crashes:

- Rear-end crashes (60 percent)
- Single vehicle off-road crashes (22 percent)
- Sideswipe crashes (15 percent)

¹³ The total number of crashes has changed since the Draft EIS due to the number reported in the Draft EIS not including crashes on I-94 between 25th Street and 16th Street. An addendum to the *I-94 East-West Stadium Interchange Crash Analysis Technical Memorandum* is located on the CD at the back of the document.

WisDOT Crash Rate Calculation

WisDOT collects all available Wisconsin crash data and develops statewide average crash rates for all highway functional classifications.

The Wisconsin statewide averages for the large urban freeway classification is developed using all freeways that are located within urban areas with populations of 25,000 or more, which includes the I-94 East-West Corridor.

Comparing the I-94 East-West Corridor crash history to the average crash rate of similar type roads within the large urban freeway classification is a valid comparative tool, and is the WisDOT standard practice in evaluating all highway projects in the state (WisDOT Facilities Development Manual 3-15-25 Reports).

Some public concerns were shared during the Draft EIS availability period regarding the appropriateness of comparing crash rates in the I-94 East-West Corridor to other urban freeways in less populous areas of the state. In an effort to further understand and evaluate these concerns, WisDOT reviewed the raw statewide data for the large urban freeway classification between 2005 and 2009. Applying the same basic calculations that are used to develop the statewide average crash rates, WisDOT filtered the data for two scenarios: to include only those freeway segments within Milwaukee County; and to include all statewide large urban freeway segments excepting those within Milwaukee County.

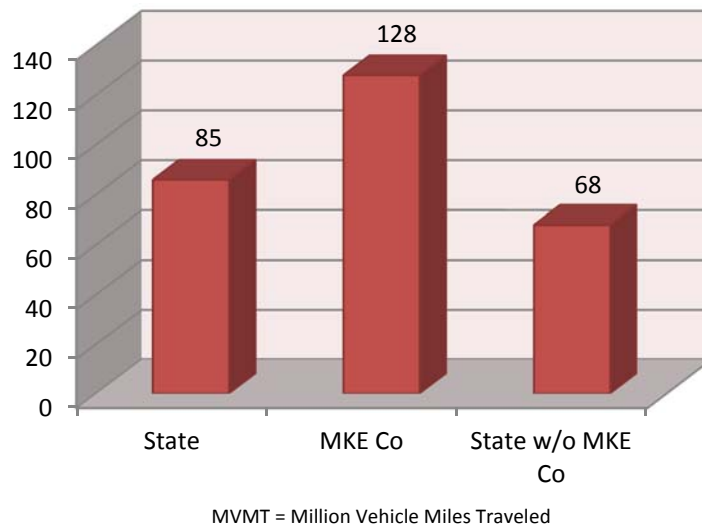
Results of this analysis are summarized in the adjacent chart. The total Milwaukee County large urban freeway approximate crash rate is much greater than the total statewide average crash rate. In addition, the approximate total statewide crash rate without including Milwaukee County data is significantly lower.

The I-94 East-West Corridor crash analysis, summarized in **Table 1-2**, indicated that there are 10 locations between 2 and 3 times the statewide average crash rate, 4 locations between 3 to 4 times the statewide average crash rate, and 3 locations greater than 4 times the statewide average crash rate. The crash analysis also indicated that, in total, there are 18 mainline I-94 East-West Corridor segments greater than the statewide crash rate.

If those same I-94 East-West Corridor crash rates were compared to the approximate Milwaukee County large urban freeway average crash rate, there are 6 locations between 2 to 3 times the Milwaukee County average crash rate, 1 location between 3 to 4 times the Milwaukee County average crash rate, and 1 location greater than 4 times the Milwaukee County crash rate. The crash analysis also indicates that, in total, there are 16 mainline I-94 East-West Corridor segments greater than the Milwaukee County average crash rate.

With either comparison, several segments of the I-94 East-West Corridor greatly exceed average crash rates for similar freeways.

Large Urban Freeway Crash Rates per 100 MVMT (2005-2009)



Rear-end and sideswipe crashes are often indicators of congestion, as well as inadequate acceleration/deceleration lanes, weaving, and substandard ramp spacing. High occurrences of rear-end crashes on a freeway are typically the result of peak hour congestion where drivers are stuck in “stop-and-go” traffic and move much slower than the average freeway speed. As a result of congestion, the probability of rear-end crashes is increased, as drivers may be forced to slow and break suddenly based on what vehicles ahead of them are doing (that is, lane changing, letting other drivers merge, etc.).

The presence of both left- and right-hand entrance and exit-ramps is also a contributing factor to these types of crashes. In general, off-road crashes by single vehicles usually indicate tight curves with inadequate banking and narrow shoulders. Additional information regarding crashes in the I-94 East-West Corridor can be found in the *I-94 East-West Corridor Crash Analysis Technical Memorandum* (September 2012) and *I-94 East-West Corridor Crash Analysis Technical Memorandum ADDENDUM* (November 2015), located on the CD at the back of this document.

Crashes within the I-94 East-West Corridor contribute to traffic congestion on I-94, which leads to increased travel times within the study area. The extent of the congestion depends on the severity of the crash and the number of lanes affected.

1.3.4 Existing Freeway Conditions and Deficiencies

1.3.4.1 Pavement Condition

Since WisDOT constructed I-94 in the early 1960s, the original concrete pavement has worn and cracked. Water enters pavement cracks and rusts the steel bars that hold the slabs of concrete together (**Exhibit 1-5**). Water also runs through the cracks to the gravel base under the pavement and can wash out the finer gravel material. The erosion leaves a void beneath the pavement and decreases pavement stability. Water trapped within existing cracks expands when it freezes, widening the cracks. Freeze-thaw cycles and heavy trucks also add to pavement stress.

WisDOT first resurfaced I-94 in 1975 and 1976. Resurfacing restored the roadway’s smooth riding surface but did not address the cracks in the concrete or the voids in the underlying gravel base. WisDOT resurfaced I-94 again in 1997 and 1998. The westbound lanes received a third overlay in 2011, and the eastbound lanes received a third overlay in 2012. In general, each highway resurfacing has a shorter life span than the previous resurfacing because the original pavement, still in place after 50 years, provides a less effective base as the concrete continues to crack and deteriorate (**Exhibit 1-6**). In fact, during the 2011-2012 resurfacing, WisDOT replaced over 5,000 square yards of the original pavement (out of roughly 190,000 square yards of pavement on I-94 in the study area), and the 1997–1998 resurfacing included replacing over 1,300 square yards of the original pavement because of its deterioration. Based on WisDOT’s experience with other highways, resurfacing the study area freeway system again would not be cost effective.

SEWRPC projected the remaining pavement life of southeastern Wisconsin freeways as a part of the 2003 *A Regional Freeway System Reconstruction Plan for Southeastern Wisconsin* (SEWRPC 2003). The analysis estimated that the I-94 pavement in the study area would reach the end of its life expectancy¹⁴ between 2006 and 2010. The analysis took place prior to the 2011–2012 resurfacing.

1.3.4.2 Bridge Condition

There are 34 bridges located in the I-94 East-West Corridor, 17 of which carry I-94 traffic. The other bridges are located on cross streets spanning over I-94, on the Stadium Interchange ramps, and along US 41 and Miller Park Way. The structural condition of the study area freeway system’s bridges is a factor in the need for the project. The condition of the bridges has deteriorated over the years due to age, heavier than expected traffic, road salt, freeze-thaw cycles, and water entering cracks in the bridges. At some specific locations, bridge clearances (the vertical distance from pavement to the lowest portion of the bridge above

¹⁴ Life expectancy in the SEWRPC analysis was based on pavement condition, total traffic, truck traffic, construction history, and the number and timing of resurfacings.

the roadway) are below current criteria (see **Table 1-7**). Taller vehicles strike the bridges, causing additional and accelerated deterioration.

Bridge Types

Most highway bridges in Wisconsin are concrete or steel girder bridges. In the I-94 East-West Corridor, there are the following 6 types of bridges: steel girder (22 bridges), concrete girder (6), voided slab (2), haunched slab (1), steel “K” frame (1), and concrete rigid frame (2).

Girder bridges have a deck, the concrete surface on which vehicles drive. The deck is supported by concrete or steel girders that lie horizontally under the deck. Vertical concrete piers or columns that are anchored in the ground support the girders. When the deck wears out, it can be removed and replaced. The girders, which typically last longer than the decks, remain in place (**Exhibit 1-7**).

Voided slab bridges carry I-94 over Mitchell Boulevard. A voided slab bridge is not a continuous slab of concrete. The concrete has cylindrical “voids” similar to a box girder but thinner (**Exhibit 1-7**). A haunched slab bridge carries I-94 over Hawley Road. A haunched slab bridge is made of continuous concrete, and its slab is tapered so that the concrete is thicker over the bridge piers than between them (**Exhibit 1-7**). The deck on a slab bridge is a part of the bridge’s weight-bearing structure, which makes it difficult to replace the deck on a slab bridge without replacing the entire slab structure.

The Zablocki Drive bridge over I-94 (cemetery access road) is a steel “K” frame bridge that has a concrete deck supported by a steel frame. Concrete rigid-frame bridges carry I-94 over Yount Drive. With this type of bridge, the substructure and superstructure are a single piece of concrete (**Exhibit 1-7**).

Deterioration

Since this portion of I-94 opened to traffic, 18 bridges along I-94 have received new decks and others have received a concrete or asphalt overlay. The superstructures of two bridges (27th Street and 26th Street over I-94) were replaced in 2006. Overlays typically provide a smooth driving surface and, in some cases, slow down the rate of deterioration by sealing out water. The main deterioration on the bridges occurs beneath the overlays.

The bridges in the I-94 East-West Corridor were constructed using reinforced concrete. Reinforced concrete consists of concrete with steel reinforcing bars, also referred to as rebar, placed in the concrete for added tensile strength. When the steel rebar is exposed to air and road salt, it rusts. The deicing salts used on roads in Milwaukee County contain chlorides that accelerate the formation of rust. When the salt-laden water from the roadway enters cracks in the concrete, it eventually causes the rebar steel to rust and weaken. The rust on the rebar expands and exerts pressure on the concrete that cracks from within, creating a spall, or pothole, on the top or bottom of the bridge. As the process continues, the spalls become larger, resulting in more concrete chipping and falling off the bridge and steel rebar losing its overall strength (**Exhibit 1-8**).

When spalls on the top of the bridge deck occur, an overlay of concrete or asphalt is needed. The overlay restores a smooth driving surface and offers some protection to the rusted steel rebar. As the overlay deteriorates, however, the steel rebar in the deck will once again continue to rust. The extent of the additional deterioration is not immediately visible and may become very severe before a pothole reappears on the deck surface. The extensive deterioration results in reduced load-carrying capacity for the bridge, which can lead to weight restrictions on the bridge and eventually require repair or replacement. New bridges have improved concrete, joints, and rebar.

Another factor contributing to bridge deterioration is that the bridges in the study area are carrying more traffic than they were originally designed to carry. When I-94 was designed, a more extensive freeway system was planned for southeastern Wisconsin. Eliminating several segments of the planned southeast Wisconsin freeway system in the 1970s resulted in I-94 carrying more traffic than anticipated in a 1957 traffic analysis and forecast completed by the Milwaukee County Expressway Commission (Milwaukee County Expressway Commission 1957).

Existing Bridge Condition Ratings

FHWA maintains the National Bridge Inventory (NBI), which is a comprehensive database of structural and appraisal data collected by each state for all bridges in the United States. The inventory includes each bridge's structural and functional properties. One of the appraisal ratings, the Structural Evaluation Appraisal Rating, was used to evaluate the condition of the bridges in the I-94 East-West Corridor. The rating takes into account the condition of the bridge's girders and piers, in addition to the bridge's safe load level and the amount of traffic carried by the bridge (FHWA 1995). The functional deficiencies of the study area bridges are documented later in this section.

The Structural Evaluation Appraisal Rating ranges from 0 to 9, with 9 being "superior to present desirable criteria" and 0 being a closed bridge. Many of the bridges in the study area have ratings of 5 or 6, defined as "somewhat better than minimum adequacy to tolerate being left in place as is" and "equal to present minimum criteria." Over the next several years, several of the bridges would likely decline to a rating of 4 based on WisDOT's experience with bridge deterioration.¹⁵ **Table 1-3** lists bridges in the study area by their Structural Evaluation Appraisal Rating.

The deterioration is the result of rusted rebar, which reduces the bridge's load-carrying capacity and causes concrete to spall and chip. Use of the bridges by higher-than-expected traffic volumes, in combination with their outdated design, has hastened the deterioration. If any Modernization Alternative were implemented, bridges in the corridor would be rebuilt regardless of their condition.

TABLE 1-3

Structural Evaluation Appraisal Ratings

Rating	Location
5	Westbound I-94 over Mitchell Blvd; Eastbound I-94 over Mitchell Blvd; Westbound I-94 over Yount Drive; 25 th Street over I-94; Bluemound Road over US 41; Westbound I-94 over Canadian Pacific Railroad; 35 th Street over I-94; Westbound I-94 over Northbound US 41.
6	I-94 over Hawley Road; Eastbound I-94 over Yount Drive; Eastbound I-94 over 44 th Street; Eastbound I-94 over Canadian Pacific Railroad; I-94 over 32 nd Street; 27 th Street over I-94; Westbound I-94 to Southbound US 41 ramp over land; Westbound I-94 to Southbound US 41 ramp over Eastbound I-94; Southbound US 41 over Westbound I-94; Southbound US 41 over Eastbound I-94; Southbound US 41 to Eastbound I-94 ramp over 44 th Street; Southbound US 41 to Eastbound I-94 ramp over Menomonee River; Southbound US 41 over Northbound US 41 to Westbound I-94 ramp; Southbound US 41 over land; Southbound US 41 over I-94; Northbound US 41 to Westbound I-94 over Eastbound I-94; Westbound I-94 over 68 th Street; Eastbound I-94 over 68 th Street; Westbound I-94 over 64 th Street; Eastbound I-94 over 64 th Street.
7	Westbound I-94 over 70 th Street; Eastbound I-94 over 70 th Street; 26 th Street/St. Paul Avenue over I-94; Eastbound I-94 over Northbound US 41; Frederick Miller Way over US 41; Southbound US 41 over Selig Drive; Northbound US 41 over Selig Drive.

Note: The decks of the Wells Street and Wisconsin Avenue bridges over US 41 were replaced in 2014. An updated Structural Evaluation Appraisal Rating has not been determined for these bridges.

1.3.4.3 Freeway Design Deficiencies

Overview

New and reconstructed freeways must meet the minimum values for 13 controlling design criteria, such as alignments, lane and shoulder widths, and sight distance. Design criteria developed for the controlling elements are based on AASHTO's *A Policy on Geometric Design of Highways and Streets, 6th Edition* (2011a), AASHTO's *A Policy on Design Standards – Interstate System* (2005), and WisDOT's *Facilities Development Manual*. The documents are the basis for evaluating the study area freeway system for acceptability, function, and safety.

¹⁵ The Zablocki Drive bridge over I-94 just west of Mitchell Boulevard has a 10-ton weight limit, which is well below most bridges, and has a structural evaluation appraisal rating of 2. The bridge was designed and built with the 10-ton limit; it is not the result of deterioration. The bridge provides access to the VA Medical Center and the VA's Wood National Cemetery. The VA stated that the weight limit does not affect its use of the bridge. Therefore, this EIS does not list this bridge as deficient.

Design criteria in WisDOT's *Facilities Development Manual* govern design of the alternatives. The *Facilities Development Manual* guidelines generally meet or exceed AASHTO criteria. However, where the *Facilities Development Manual* does not address AASHTO criteria, the AASHTO criteria govern.

The following deficient freeway design criteria are discussed in this section:

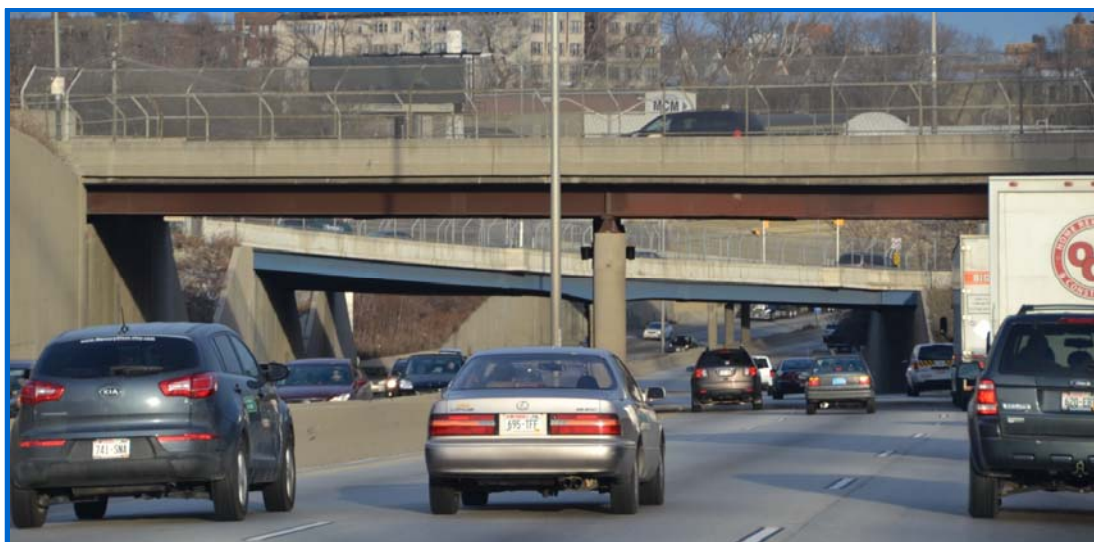
- **Horizontal Curves**—Several curves on I-94 have a radius and superelevation that result in design speeds less than the recommended freeway design speed.
- **Vertical Alignment**—One study area location has an inadequate vertical grade.
- **Stopping Sight Distance**—There are several locations where existing design speed is less than the minimum recommended design speed based on stopping sight distance.
- **Decision Sight Distance**—There are eight locations that do not meet minimum standards for decision sight distance.
- **Cross Section**—The inside shoulder width along I-94 does not meet standards. Shoulder widths on all service interchange ramps and three ramps in the Stadium Interchange do not meet guidelines.
- **Vertical Clearance**—There are 16 bridges in the study area with inadequate vertical clearance.
- **Ramp Spacing**—There are 12 locations in the study area where minimum ramp spacing is not provided, causing unsafe weaving movements.
- **Left-hand Entrances and Exits**—There are 10 locations where left-hand ramps combined with closely spaced service interchanges create unsafe situations.
- **Ramp Taper Rates**—There are 18 locations where the ramp taper rate does not allow for adequate merging distance.
- **Acceleration and Deceleration Lanes**—There are 10 entrance and exit ramps that have inadequate acceleration and deceleration lengths.

Exhibit 1-9 gives an overview of the design deficiencies in the study area.

Horizontal Curves

Design speed is the maximum safe speed that a driver can maintain over a specific section of highway. Factors such as highway type, topography, adjacent land use, and driver expectations affect design speed. According to AASHTO's *A Policy on Geometric Design of Highways and Streets*, higher design speeds are closely related to the overall quality and safety of a roadway. To account for a wide range of vehicle speeds, the design speed is generally 5 miles per hour (mph) greater than the posted speed limit. Based on WisDOT and AASHTO policy, **Table 1-4** summarizes the recommended design speeds for the I-94 East-West Corridor. As noted in **Table 1-4**, some existing design speeds on I-94 and US 41/Miller Park Way are lower than the minimum recommended design speed. This is because freeway design standards have changed, and continue to do so, since the roadways were originally constructed. The standards change due to changing driver behavior, changes in vehicles driven, and continuing research of existing freeways. When the original freeways were built, no data were available showing which design features would cause safety issues.

On freeways, curves should be designed to allow the driver to negotiate the curves safely without reducing speed. A larger curve radius results in a more gradual curve and allows higher design speed. Another element that influences a vehicle's speed through a curve is the amount of banking, or superelevation, in the curve. Superelevation is the extent to which the roadway is banked to offset the tendency of vehicles to slide outward or overturn on a curve. A smaller curve radius requires more banking than a larger curve to ensure vehicle safety. Several curves in the study area freeway system have a radius and superelevation that result in design speeds less than the recommended freeway design speed (**Table 1-4** and **Exhibit 1-10**). For example, the combination of a horizontal curve at the bottom of a hill between 32nd Street and 18th Street reduces sight distance. Sight distances are also limited by existing local street bridges passing over I-94. Improved sight distance allows drivers more time to react to roadway obstructions and make decisions on lane selection.



Existing I-94 looking eastbound at 27th Street. The combination of a horizontal and vertical curve is evident in this photograph.

TABLE 1-4

Horizontal Alignment—Minimum Recommended Design Speeds and Existing Design Speeds

Location	Minimum Recommended Design Speed (mph)	Existing Design Speed (mph)
I-94 between 70 th Street and Hawley Road	60	40-45
I-94 between Hawley Road and Mitchell Boulevard	60	45
I-94 between Mitchell Boulevard and Stadium Interchange	55-60	45-60
I-94 between Stadium Interchange and 35 th Street	55	45-50
I-94 between 35 th Street and 25 th Street	55	40-65
I-94 between 25 th Street and 16 th Street	55	45
US 41 between Stadium Interchange and Wells Street	50-55	45
Miller Park Way between Stadium Interchange and Canal Street/Frederick Miller Way	50	45-55
<i>Stadium Interchange Ramps:</i>		
I-94 eastbound to US 41 northbound	40-50	30
I-94 eastbound to Miller Park Way southbound	40-50	30-35
I-94 westbound to US 41 northbound	40-50	30-40
I-94 westbound to Miller Park Way southbound	40-50	30
Miller Park Way northbound to I-94 eastbound	40-50	30
Miller Park Way northbound to I-94 westbound	40-50	30-35
US 41 southbound to I-94 eastbound	40-50	20-60
US 41 southbound to I-94 westbound	40-50	35

System interchange ramps connect one freeway to another. According to AASHTO, such ramps are typically designed to have speeds that are 50 to 85 percent of the freeway design speed. As a result, the minimum recommended design speed for each system interchange ramp in the Stadium Interchange is between 40 and 50 mph (Table 1-4).

Vertical Alignment

Vertical alignment refers to the grade or steepness of a roadway. Roadway grades have a direct correlation to the uniform operational speed of vehicles.

Vehicle weight and the steepness of the roadway grade have a direct relationship on the ability of the driver to maintain uniform speed. Lack of uniform speed creates traffic conflicts, and crashes are often the result. WisDOT guidelines recommend a maximum freeway grade of 3 percent along flat terrain and 5 percent for ramps; however, in some situations, a ramp grade of up to 8 percent is acceptable, if the length of such grade is relatively short. The grade on I-94 from 25th Street to 16th Street is above WisDOT's maximum grade guidelines for flat terrain. In general, the flatter the road, the safer it is to drive.

However, WisDOT and AASHTO guidelines recommend a slight grade on freeways to ensure that water properly drains off the roadway. On a completely flat road, water tends to pond, increasing the risk of vehicles hydroplaning. AASHTO recommends a minimum 0.3 percent grade on roadways for drainage, with 0.5 percent being desirable. The eastbound I-94 exit ramp to northbound US 41 and northbound US 41/Miller Park Way through the Stadium Interchange each have a minimum vertical grade that is less than desirable, but not below the minimum acceptable grade.

Stopping Sight Distance

Stopping sight distance is the minimum distance required by a driver traveling at a given speed to stop a vehicle after sighting an object in its path.¹⁶ Minimum stopping sight distance is based on the design speed of a roadway. On hill crests, sight is obstructed by the roadway between the driver and an object. At the bottom of a hill, sight is restricted at night because headlights do not fully illuminate the roadway ahead. On curves, a median barrier may reduce stopping sight distance. According to AASHTO criteria, the minimum stopping sight distance should be 495 feet for I-94 in the study area, based on the recommended design speed of 55 mph and 570 feet based on a recommended design speed of 60 mph. For the Stadium Interchange ramps, the minimum required stopping sight distance should be 305 to 425 feet, based on the minimum recommended design speeds of 40 to 50 mph. Most of the Stadium Interchange ramps do not meet minimum stopping-sight distance criteria. Table 1-5 and Exhibit 1-11 note the locations on the study area freeway system where the existing design speed is less than the minimum recommended design speed based on stopping sight distance.



Westbound I-94 exit at Hawley Road

¹⁶ Stopping sight distance differs from vertical alignment or grade. Stopping sight distance can be inadequate even if the vertical alignment is adequate and vice versa. A crest in the road or median barriers can interfere with the driver's line of sight around a curve and affect stopping sight distance. Vertical grade measures the steepness of a roadway. A gradual transition to a steep grade may not affect the driver's line of sight.

TABLE 1-5

Stopping Sight Distance—Minimum Recommended Design Speeds and Existing Design Speeds

Location	Minimum Recommended Design Speed (mph)	Existing Design Speed (mph) Based on Stopping Sight Distance
I-94 west of the Stadium Interchange	55-60	30-70+
I-94 east of the Stadium Interchange	55	40-70+
I-94 through the Stadium Interchange	55	35-70+
Miller Park Way south of Stadium Interchange	50	35-65
US 41 north of Stadium Interchange	55	35-45
<i>Stadium Interchange Ramps:</i>		
I-94 eastbound to US 41 northbound	40-50	25-30
I-94 eastbound to Miller Park Way southbound	40-50	25-30
Miller Park Way northbound to I-94 eastbound	40-50	25
Miller Park Way northbound to I-94 westbound	40-50	25
I-94 westbound to US 41 northbound	40-50	25
US 41 southbound to I-94 westbound	40-50	25-40

Decision Sight Distance

Decision sight distance provides a driver sufficient time for safe decision making. While stopping sight distance is the minimum distance required to bring a vehicle to a complete stop, decision sight distance gives a driver sufficient time to detect an object, recognize its threat potential, select an appropriate speed and path, and perform the required action safely and efficiently. The decisions most commonly occur prior to exits, major forks, and lane drops. The minimum decision sight distance is based on AASHTO and WisDOT design criteria.

The following areas do not meet AASHTO's or WisDOT's minimum design criterion for decision sight distance:

- The eastbound entrance to I-94 at 68th Street
- The westbound entrance to I-94 at 70th Street
- The eastbound entrance to I-94 at Hawley Road
- The westbound entrance to I-94 at Hawley Road
- The eastbound entrance to I-94 at Mitchell Boulevard
- The westbound entrance to I-94 at Mitchell Boulevard
- The eastbound entrance to I-94 at 35th Street
- The westbound entrance to I-94 at 35th Street

Cross Section

A roadway's cross section refers to the ditches, shoulders, median, and travel lanes that make up the roadway. The width of travel lanes and shoulders both inside and outside the travel lanes are key elements of freeway design. Through most of the study corridor, I-94 has three 12-foot lanes that conform to current WisDOT and AASHTO standards. As part of the construction completed in spring 2013, westbound I-94 was reconfigured to have four 11-foot lanes between the Marquette Interchange and 35th Street (3 mainline lanes and 1 auxiliary lane).

For shoulders, FHWA and WisDOT have adopted AASHTO's *A Policy on Design Standards – Interstate Systems* (2005) standard freeway lane widths of 12 feet and consideration of 12-foot paved shoulders where truck traffic exceeds 250 design hourly volume (DHV) in the design year. Narrow inside shoulders result in disabled vehicles having to cross 3 lanes of traffic to reach a safe area on the outside shoulder. In addition, inside shoulders provide room for drivers to avoid crashes and for snow storage and emergency vehicle access. **Table 1-6** provides existing and recommended inside and outside shoulder widths along I-94 in the study area.

TABLE 1-6

Segments of Existing I-94 with Substandard Shoulder Widths

Location	Inside Shoulder Width (feet)	Outside Shoulder Width (feet)	Recommended Width (feet) ^a
I-94 eastbound:			
70 th Street to Hawley Road	2-12	10-12	12
Hawley Road to Mitchell Boulevard	2-3	6-12	12
Mitchell Boulevard to Stadium Interchange	2-4	10-12	12
Stadium Interchange to 35 th Street	4-10	10	12
35 th Street to 25 th Street	2-9	4-10	12
25 th Street to 16 th Street	1-9	4-10	12
I-94 westbound:			
16 th Street to 25 th Street	1-9	1-9	12
25 th Street to 35 th Street	2-9	1-9	12
35 th Street to Stadium Interchange	4-8	1-10	12
Stadium Interchange to Mitchell Boulevard	2-6	10	12
Mitchell Blvd. to Hawley Road	2-4	2-12	12
Hawley Road to 70 th Street	2-12	8-12	12

^a For shoulders, FHWA and WisDOT have adopted AASHTO's *A Policy on Design Standards—Interstate Systems* (2005) standard freeway lane widths of 12 feet and consideration of 12-foot paved shoulders where truck traffic exceeds 250 DHV in the design year.

Per AASHTO criterion, when paved shoulders are provided on ramps, they should have a uniform width for the full length of the ramp. For one-way operation, the sum of the right and left shoulder widths is typically between 10 and 14 feet. A paved shoulder of 2 to 4 feet is desirable on the left, with the remaining width of 8 to 10 feet used for the paved right shoulder. The following three ramps in the Stadium Interchange do not meet AASHTO criterion: Miller Park Way northbound to I-94 eastbound (4-foot right shoulder), US 41 southbound to I-94 eastbound (4-foot right shoulder), and I-94 westbound to US 41 northbound (3-foot right shoulder).

None of the service interchange ramps meets the criterion. Each ramp currently has 2-foot shoulders on each side of the ramp.

According to WisDOT guidelines, single-lane freeway ramps should have a 22-foot width measured from face-of-curb to face-of-curb. The following are locations where curbed ramps are substandard; they have widths of less than 22 feet:

- Portion of I-94 eastbound entrance at 68th Street
- Portion of I-94 eastbound entrance at Hawley Road
- Portion of I-94 eastbound exit at Mitchell Boulevard
- Portion of I-94 westbound entrance at 35th Street
- Portion of I-94 westbound entrance at Hawley Road

Vertical Clearance

Vertical clearance is the distance between a roadway and a bridge over it. Adequate vertical clearance is required to prevent taller vehicles, including military vehicles, from hitting bridges. Minimum vertical clearance requirements differ based on the type of roadway. Since Interstate Highways are part of the National Highway System, they require a minimum 16-foot clearance to accommodate oversized vehicles. WisDOT guidelines call for a 16-foot, 9-inch clearance for new or replaced bridges (when the superstructure is reconstructed) to allow for a 4- to 9-inch asphalt overlay in the future. Sixteen of the bridges in the study area do not meet the minimum vertical clearance criteria. **Table 1-7** lists the substandard locations and the minimum criteria.



I-94 westbound bridge over Mitchell Boulevard. Due to the low clearance of this bridge, several trucks crashed into the underside of the bridge and became stuck. The incidents have contributed to the deterioration of the bridge.

TABLE 1-7

Bridges with Inadequate Vertical Clearance

Location	Minimum Vertical Clearance Criteria	Existing Vertical Clearance
Mainline I-94:		
Eastbound I-94 over Mitchell Boulevard	14 feet (over arterial)	12 feet, 6 inches
Westbound I-94 over Mitchell Boulevard	14 feet (over arterial)	12 feet, 8 inches
35 th Street over I-94	16 feet (over freeway)	15 feet, 5 inches
26 th Street/St. Paul Avenue over I-94	16 feet (over freeway)	14 feet, 10 inches
25 th Street over I-94	16 feet (over freeway)	15 feet, 2 inches
Stadium Interchange:		
Eastbound I-94 over northbound US 41	16 feet (over freeway)	14 feet, 5 inches
Westbound I-94 over northbound US 41	16 feet (over freeway)	13 feet, 10 inches
Southbound US 41 ramp to eastbound I-94 over westbound I-94	16 feet (over freeway)	13 feet, 11 inches
Southbound US 41 ramp to eastbound I-94 over westbound I-94 ramp to southbound Miller Park Way	16 feet (over freeway)	13 feet, 7 inches
Northbound Miller Park Way ramp to westbound I-94 over eastbound I-94	16 feet (over freeway)	14 feet, 4 inches
Southbound US 41 over northbound Miller Park Way to westbound I-94	16 feet (over freeway)	14 feet, 11 inches
Southbound US 41/Miller Park Way over I-94	16 feet (over freeway)	14 feet, 5 inches
Westbound I-94 ramp to southbound Miller Park Way over eastbound I-94	16 feet (over freeway)	14 feet, 7 inches

TABLE 1-7

Bridges with Inadequate Vertical Clearance

Location	Minimum Vertical Clearance Criteria	Existing Vertical Clearance
US 41:		
Bluemound Road over US 41	16 feet (over freeway)	14 feet, 6 inches
Wisconsin Avenue over US 41	16 feet (over freeway)	15 feet, 6 inches
Wells Street over US 41	16 feet (over freeway)	14 feet, 7 inches

Interchange Configuration and Spacing

System interchanges are those that connect two or more freeways. Service interchanges, like the Hawley Road interchange, are those that connect freeways with surface streets and cross roads. The service interchanges located along I-94 and the Stadium Interchange each have numerous ramps that do not meet current design criteria.

Currently, none of the study area interchanges meets WisDOT or AASHTO design criteria for minimum spacing requirements between interchanges. WisDOT guidelines require 2 miles between interchanges in an urban setting, while the AASHTO criterion requires 1 mile. Over the 2.8-mile segment of I-94 between the 70th Street interchange and the 25th/26th/28th Street interchange, there are six interchanges—an average of more than 2 per mile.

Ramp Spacing

The risk of crashes increases when successive entrance and exit ramps are in close proximity or when through traffic is disrupted by lane changes while entering or exiting the freeway. A combination of factors creates dangerous weaving segments along I-94. AASHTO's minimum desired spacing between interchanges in an urban setting is 1 mile. WisDOT and AASHTO guidelines call for minimum 2,000-foot spacing for ramps between system interchanges and service interchanges, and 1,600-foot spacing between service interchange ramps to provide adequate weaving distance and space for signing (AASHTO 2011b). WisDOT constructed I-94 prior to the development of the current design criteria; thus, the ramp spacing does not meet existing criteria

*I-94, looking east from the Hawley Road interchange*

in all locations. **Table 1-8** lists locations where the study area freeway system does not provide the minimum ramp spacing.

TABLE 1-8

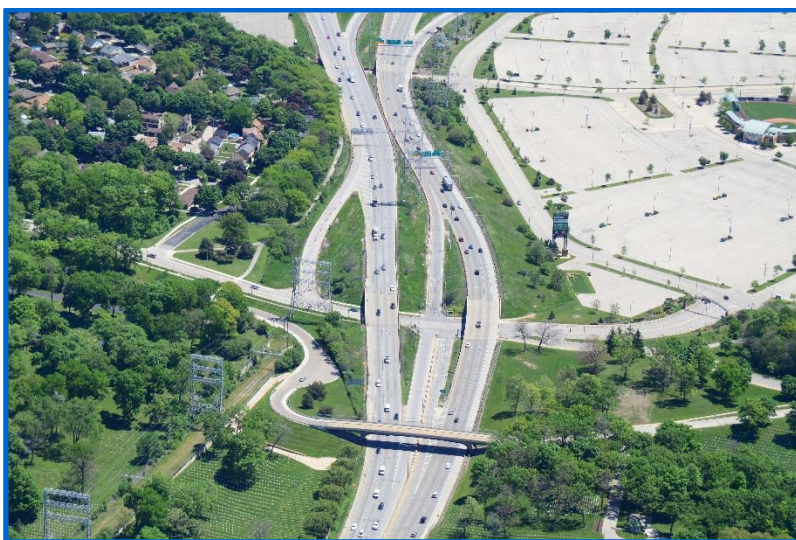
Locations Where Minimum Ramp Spacing is Not Provided

Location	Minimum Ramp Spacing (feet)	Existing Spacing Between Ramps (feet)
I-94 eastbound entrance from 68 th Street to Hawley Road	1,600	1,050
I-94 eastbound entrance from Hawley Road to Mitchell Boulevard	1,600	595
I-94 eastbound entrance from Mitchell Boulevard to Stadium Interchange	2,000	850
I-94 eastbound entrance from Stadium Interchange to 35 th Street	2,000	1,635
I-94 westbound entrance from St. Paul Avenue/28 th Street to 35 th Street	1,600	615
I-94 westbound entrance from 35 th Street to Stadium Interchange	2,000	1,745
I-94 westbound entrance from Stadium Interchange to Mitchell Boulevard	2,000	605
I-94 westbound entrance from Hawley Road to 68 th Street	1,600	1,000
Miller Park Way northbound entrance from Frederick Miller Way/Canal Street to Stadium Interchange	2,000	1,660
Miller Park Way southbound entrance from Stadium Interchange to Frederick Miller Way/Canal Street	2,000	1,660
US 41 northbound entrance from Stadium Interchange to Wisconsin Avenue	2,000	760
US 41 southbound entrance from Wisconsin Avenue to Stadium Interchange	2,000	650

Left-hand Entrances and Exits

The Stadium Interchange and the Mitchell Boulevard interchange were designed with left-hand entrances and exits. National design criterion call for all freeway entrances and exits to be on the right-hand side (AASHTO 2011b). Left-hand entrance and exit ramps violate driver expectations. Reconstruction of the Marquette Interchange eliminated all left-hand entrances and exits, and the Zoo Interchange will be reconstructed with no left-hand entrances and exits. The lack of left-hand entrances and exits at the major system interchanges on each end of this study corridor will create driver expectations of no left-hand entrances and exits within the study corridor.

The following left-hand ramps in the Stadium Interchange and Mitchell Boulevard interchange, combined with closely spaced service interchanges at Hawley Road, Mitchell Boulevard, 35th Street, Bluemound Road/Wisconsin Avenue/Wells Street, and Frederick Miller Way/Canal Street, create unsafe situations where drivers must weave across multiple lanes in a short distance to reach their exit:



Left-hand entrances and exits at Mitchell Boulevard interchange (looking east)

- I-94 Eastbound
 - The right-hand entrance from Hawley Road to eastbound I-94 is approximately 0.1 mile from the left-hand Mitchell Boulevard exit.
- I-94 Westbound
 - The left-hand entrance from Mitchell Boulevard to westbound I-94 is approximately 0.3 mile from the right-hand exit to Hawley Road.
- Stadium Interchange
 - The left-hand entrance from Mitchell Boulevard to eastbound I-94 is approximately 0.15 mile from the right-hand exit to southbound Miller Park Way in the Stadium Interchange.
 - The left-hand entrance in the Stadium Interchange from southbound US 41 to eastbound I-94 is approximately 0.3 mile from the right-hand exit to 35th Street.
 - The right-hand entrance from 35th Street to westbound I-94 is approximately 0.3 mile from the left-hand southbound Miller Park Way exit in the Stadium Interchange.
 - The left-hand entrance in the Stadium Interchange from northbound Miller Park Way to westbound I-94 is approximately 0.1 mile from the right-hand exit to Mitchell Boulevard.
 - The left-hand entrance in the Stadium Interchange from westbound I-94 to southbound Miller Park Way is approximately 0.3 mile from the right-hand exit to Frederick Miller Way/Canal Street.
 - The right-hand entrance from Frederick Miller Way/Canal Street to Miller Park Way northbound is approximately 0.3 mile from the left-hand exit to I-94 westbound in the Stadium Interchange.
 - The left-hand entrance in the Stadium Interchange from eastbound I-94 to northbound US 41 is approximately 0.15 mile from the right-hand Wisconsin Avenue exit.
 - The right-hand entrance from Wisconsin Avenue to US 41 southbound is approximately 0.1 mile from the left-hand I-94 eastbound exit in the Stadium Interchange.

According to WisDOT's *Facilities Development Manual*, FHWA research indicates that the use of right-hand entrances and exits compared to left-hand ramps may reduce crashes by 25 to 70 percent. Refer to Section 1.3.3, High Crash Rates, and **Exhibit 1-4**, for additional information.

Ramp Taper Rates

Adequate merging distance is measured by a ramp's taper rate. According to WisDOT and AASHTO guidelines, the taper rate for a freeway entrance ramp should be 50 to 1 (50:1), which means the merge lane becomes 1 foot narrower for every 50 feet of length. The minimum WisDOT taper rate guideline for a freeway exit ramp is 15:1, while AASHTO taper rates vary between 10:1 and 30:1, depending upon the divergence angle of the exit. **Table 1-9** lists locations with substandard ramp taper rates.

TABLE 1-9

Locations with Substandard Ramp Taper Rates

Location	Minimum Taper Rate Criteria	Existing Taper Rate
I-94 eastbound entrance from 68 th Street	50:1	22.5:1
I-94 eastbound exit to Hawley Road	15:1	9:1
I-94 eastbound entrance from Hawley Road	50:1	46:1
I-94 eastbound entrance from Mitchell Boulevard	50:1	13:1
I-94 eastbound exit to southbound Miller Park Way	15:1	7.5:1
I-94 eastbound entrance from 35 th Street	50:1	25:1

TABLE 1-9
Locations with Substandard Ramp Taper Rates

Location	Minimum Taper Rate Criteria	Existing Taper Rate
I-94 eastbound exit to 26 th Street/St. Paul Avenue	15:1	10:1
I-94 westbound entrance from 35 th Street	50:1	22.5:1
I-94 westbound exit to 35 th Street	15:1	7.5:1
I-94 westbound exit to southbound Miller Park Way	15:1	7:1
I-94 westbound exit to Mitchell Boulevard	15:1	12:1
I-94 westbound entrance from Mitchell Boulevard	50:1	22.5:1
I-94 westbound entrance from Hawley Road	50:1	34:1
I-94 westbound exit to 68 th Street	15:1	10:1
I-94 westbound entrance from 70 th Street	50:1	22.5:1
US 41 northbound entrance from I-94 westbound	50:1	32:1
US 41 northbound exit to Wisconsin Avenue	15:1	3:1
US 41 southbound entrance from Wisconsin Avenue	50:1	10:1

Acceleration and Deceleration Lanes

Ramp design includes careful consideration of adequate acceleration lanes on entrance ramps and deceleration lanes on exit ramps so that entering vehicles can accelerate to freeway speed before merging with freeway traffic and exiting vehicles can decelerate to a slowed or stopped condition at ramp intersections with cross roads. If there is a difference in speed between vehicles on the freeway and vehicles entering the freeway, crashes can occur from the resulting congestion as vehicles decelerate on the freeway to allow the vehicles to enter. The design of exit ramps should provide enough distance to safely decelerate on the ramp rather than on the freeway.

The required lengths of acceleration and deceleration lanes vary depending on the tightness of curves on the ramp. An entrance ramp that has a gradual curve allows drivers to accelerate on the ramp, and thus the length of the acceleration lane can be shorter than for an entrance ramp with tighter curves.

Table 1-10 lists entrance and exit ramps that have inadequate acceleration and deceleration lengths based on AASHTO freeway design criteria.

TABLE 1-10
Ramps with Inadequate Acceleration or Deceleration Lanes

Location	Minimum Lane Length Needed (feet)	Actual Acceleration/ Deceleration Lane Length (feet)
I-94 eastbound entrance from 68 th Street	960	550
I-94 eastbound entrance from Hawley Road	670	415
I-94 eastbound exit to Mitchell Boulevard	380	330
I-94 eastbound exit to Miller Park Way	350	160
I-94 eastbound entrance from 35 th Street	960	790
I-94 eastbound exit to 26 th Street	430	310
I-94 westbound exit to Miller Park Way	410	300
I-94 westbound entrance from Mitchell Boulevard	960	575
I-94 westbound exit to Hawley Road	430	260
I-94 westbound entrance from Hawley Road	670	350

1.3.5 Traffic Volumes

This section describes the existing and projected future traffic volumes along the I-94 East-West Corridor.

The technical memorandum titled *Travel Forecasting Methodology for I-94 East-West Corridor Study*, located on the CD at the back of the document, summarizes the process of developing forecasts of future traffic volumes on the I-94 East-West Corridor. **Exhibit 1-12** provides a graphical representation of the travel demand forecasting, WisDOT's review of the travel demand forecast, and how the project team incorporates the forecast in to the project.

WisDOT utilized forecasts developed by SEWRPC for a variety of purposes on this project. SEWRPC's forecast at the start of the I-94 East-West Corridor study represented 2035 as the horizon year. WisDOT's FDM recommends using a horizon year 20 years after construction as the "design year." At the beginning of the I-94 East-West Study, WisDOT estimated that construction year would be 2020 and the design year would be 2040. To develop a 2040 forecast, which was five years beyond the horizon year of the year 2035 plan, SEWRPC ran the full travel demand model for the year 2030 using the population, household, and employment levels envisioned in the 4th edition of SEWRPC Technical Reports 10 and 11. The vehicle trip tables developed based on the year 2030 socioeconomic conditions were then compared to year 2035 vehicle trip tables to determine a five-year increment of growth in vehicle trips (0.4 percent annually). This five-year increment was then added to the year 2035 vehicle trip table to estimate 2040 vehicle trips and travel patterns. SEWRPC assigned the 2040 vehicle trip tables to the highway networks taking into account each alternative being considered. The 2040 vehicle assignments then served as the basis of the year 2040 forecast traffic volumes developed by SEWRPC.

Following SEWRPC's submittal of the travel demand forecast, WisDOT reviews and accepts forecasts developed by the Metropolitan Planning Organization (MPO), in this case SEWRPC, consistent with Chapter 9 of the WisDOT Transportation Planning Manual (<http://wisconsindot.gov/Pages/projects/data-plan/plans-res/tpm.aspx>).

After review and approval, WisDOT's project team utilizes the design year daily no-build forecast volumes for the Purpose and Need statement. In addition to the daily volume forecasts, WisDOT's project team utilized and applied SEWRPC peak hour forecasts to be used in the various parts of the study for summarization within the EIS.

Traffic forecasts are projections of vehicles per day (vpd) for an individual segment of a roadway and are for specific segments or corridors. WisDOT uses annual average daily traffic (AADT) for its traffic forecasts. AADT is equivalent to the sum of annual vehicles that drove on the segment divided by the number of days in the year.

VMT is a measure of the miles driven within a specified area and timeframe. VMT is not relevant to projects such as the I-94 East-West Corridor study because VMT provides aggregate state or county trends that are not applicable to location-specific traffic forecasts.

Traffic forecasts are much more specific and detailed than VMT estimates. Traffic forecasts are different from VMT estimates because they indicate likely future roadway use at specific locations, while VMT measures aggregated driving patterns. WisDOT applies national best practices to produce traffic forecasts, which include using travel demand models, such as SEWRPC's travel demand model, where available, and regression techniques using historical traffic count information. WisDOT is continuously reviewing the data and methods used to produce traffic forecasts that are valid and current. The reviews includes comparisons and communication with peer agencies, as well as independent and original research.

Traffic volume is not the only factor that indicates roadway congestion, especially during heavy travel periods. Level of service is the measure of a roadway's congestion using rankings from A to F. Freeway level of service is based on the number of vehicles per hour per lane, with level of service A exhibiting free-flow traffic and level of service F exhibiting severe congestion that approaches gridlock (**Exhibit 1-13**). FHWA

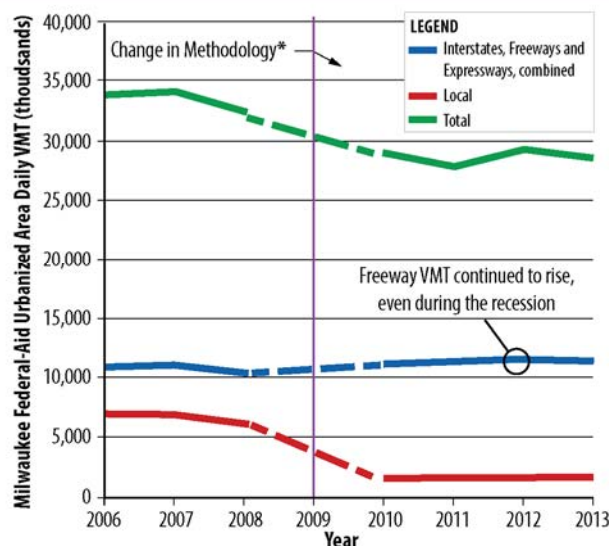
guidance generally calls for level of service C for new construction and reconstruction projects on Interstate Highways in order to meet FHWA requirements to adequately serve the existing and planned future traffic (23 *Code of Federal Regulations* [CFR] 625.2(a)(1)). Level of service D may be considered acceptable in urban areas like Milwaukee County where potential impacts to the surrounding natural or built environment resulting from achieving level of service C would be extensive and costly. FHWA agreed that level of service D is appropriate for this project. The level of service guidance for this project was documented in the *DHV and LOS for the I-94 East-West Stadium Interchange Study* technical memorandum from September 2012, located on the CD at the back of the document.

Level of service for existing and future traffic was determined using the 2010 Highway Capacity Software (HCS 2010) tool. HCS 2010 is a relatively simple software model that uses estimated traffic volumes (as obtained from SEWRPC) and basic freeway design inputs to estimate level of service.

Comparing Vehicle Miles Traveled (VMT) Data

Reports that compare Vehicle Miles Traveled within the Milwaukee Federal-Aid Urbanized Area before and after 2009, like *Transportation in Transition* by the WISPIRG Foundation, show a decline in total VMT from 2008 to 2010 (green line). That decrease in total VMT is caused singularly by the sharp decline in local VMT from 2008 to 2010 (red line), and therefore not representative of trends across different roadway types. Comparisons of interstate VMT and other freeways and expressways VMT from before and after 2009 are comparable, and between 2006 and 2013 the sum of interstate VMT and other freeways and expressways VMT increased 0.55 percent annually within the Milwaukee Federal-Aid Urbanized Area (blue line). As noted in Section 1.3.1 – Land Use and Transportation Planning, SEWRPC projects a 0.4 percent annual percent increase in VMT between 2001 and 2035 in Milwaukee County. WisDOT and SEWRPC use average annual daily traffic volumes to project traffic growth on individual roadways, not vehicle miles of travel. Traffic volumes are expected to increase between 0.2 and 0.5 percent per year until design year (2040) on this segment of I-94, depending on the specific location. After five years of increase, Milwaukee-area interstate, freeways, and expressways VMT decreased by 1.7 percent in 2013 (local road VMT decreased by 2.7 percent, for a total decrease of 2.2 percent). Although the Milwaukee Urbanized Area VMT decreased by 2.2 percent in 2013, national and statewide VMT trends are going up. Travel on the nation's highways in the first six months of 2015 was the highest VMT for the first half of any year.

Source: <http://www.fhwa.dot.gov/pressroom/fhwa1557.cfm>



* NOTE: There is no data available for 2009.

SOURCE: Milwaukee Federal-Aid Urbanized Area: Table HM-71

(Source: <http://www.fhwa.dot.gov/policyinformation/statistics.cfm>)

VMT_Insert_v15

1.3.5.1 Existing Traffic Volumes

As discussed in Section 1.3.2 and as shown in **Exhibit 1-3**, the I-94 East-West Corridor is adjacent to or provides a connection to many local destinations. Many of the destinations create constant traffic demand daily. Other destinations, such as Miller Park or State Fair Park, host large events that place increased demand on the freeway system at varying times.

In the study area, I-94 currently carries between 143,000 and 160,500 vpd on an average weekday (Year 2009 volumes; **Exhibit 1-14**). Year 2009 average weekday volumes between Hawley Road and Mitchell Boulevard were approximately 159,000 vpd. Volumes between the Stadium Interchange and 35th Street

were approximately 160,500 vpd and 143,000 vpd at 26th Street. The weekday volumes represent an annual average over a year of weekdays. This includes typical weekday commuter traffic, as well as special events (Milwaukee Brewers baseball games, Wisconsin State Fair, Summerfest, etc.). The study uses 2009 traffic volumes due to work on the local interstate system between 2010 and 2013. In 2010, emergency repair work and temporary closures of some bridges in the Zoo Interchange took place due to deteriorating bridge conditions. In 2011 and 2012, WisDOT resurfaced I-94, which closed some lanes of traffic. In 2013, reconfiguration of westbound I-94 occurred between the Marquette Interchange and the Stadium Interchange, which closed some lanes of traffic on I-94.

Between 1989 and 2009, traffic volumes on I-94 east of the Stadium Interchange increased approximately 6 percent (0.3 percent annually), and traffic volumes west of the Stadium Interchange increased approximately 16 percent (0.8 percent annually) based on WisDOT Division of Transportation System Development (DTSD) Southeast Region Systems Planning data. This 20-year period included a resurfacing of I-94 in the study area (1997-1999) and the reconstruction of the Marquette Interchange (2004-2008).

Based on 2009 data, during the heaviest traffic periods (peak hour), the level of service on I-94 ranges between level of service C and level of service F. Level of service is generally A on Miller Park Way south of the Stadium Interchange, and level of service ranges between A and B on US 41 north of the Stadium Interchange. The following segments of I-94 operate at level of service E (severe congestion) or level of service F (extreme congestion) during the peak hour (**Exhibit 1-15** and **Exhibit 1-16**):

- Eastbound I-94 from 64th Street to the Miller Park Way southbound exit in the Stadium Interchange during the morning peak hour
- Eastbound I-94 from 64th Street to the Hawley Road exit during the evening peak hour
- Eastbound I-94 from the Hawley Road entrance to the Mitchell Boulevard exit during the evening peak hour
- Eastbound I-94 from the Mitchell Boulevard entrance to the Miller Park Way southbound exit in the Stadium Interchange during the evening peak hour
- Eastbound I-94 from the southbound US 41 entrance to the 35th Street exit during the evening peak hour
- Eastbound I-94 from the southbound US 41 entrance to the 35th Street entrance during the morning peak hour
- Eastbound I-94 from 32nd Street to the 25th Street/Saint Paul Avenue entrance during the morning peak hour
- Eastbound I-94 at the 26th Street/St. Paul Avenue exit during the evening peak hour
- Westbound I-94 from 16th Street to the 25th Street exit during the morning peak hour
- Westbound I-94 from the St. Paul Avenue entrance to the 35th Street exit during the morning peak hour
- Westbound I-94 from the 35th Street entrance to the US 41 northbound exit during the morning and evening peak hours
- Westbound I-94 from the US 41 southbound entrance ramp to the Mitchell Boulevard exit during the morning peak hour
- Westbound I-94 from Mitchell Boulevard to the Hawley Road exit during the morning peak hour
- Westbound I-94 from the Hawley Road entrance to the 68th/70th Street exit during the morning and evening peak hours
- Westbound I-94 from the Mitchell Boulevard entrance to the Hawley Road exit during the evening peak hour

From a regional perspective, the I-94 East-West Corridor is one of the freeway and arterial corridors that experiences extreme congestion (defined by SEWRPC as level of service F) daily as illustrated in **Exhibit 1-17**. The exhibit is taken from SEWRPC's 2014 review and update to the 2035 regional transportation plan.

1.3.5.2 Future Traffic Volumes

The SEWRPC 2040 travel forecasts take into account recent and planned development in or near the study area. The estimated 2040 travel forecasts are based on the estimated 2035 forecast. SEWRPC projected its forecast out to 2040 based on the same annual growth rate used for the 2030 to 2035 timeframe (0.4 percent annually). The 2040 travel forecasts assume a 100 percent increase in public transit in terms of revenue-transit vehicle miles. See the technical memorandum titled *Travel Forecasting Methodology for I-94 East-West Corridor Study*, located on the CD at the back of the document, for more information on how WisDOT used SEWRPC's 2040 traffic forecast to assess future traffic conditions for this study.

An increase in traffic volume on I-94 is expected. Between 2009 and 2040, average weekday traffic volumes on I-94 east of the Stadium Interchange to 35th Street are expected to increase 16 percent (about 0.5 percent per year) to 186,000 vpd, while traffic volumes at 26th Street are expected to increase 12 percent (about 0.4 percent per year) to 160,000 vpd (**Exhibit 1-14**). West of the Stadium Interchange, traffic volumes are expected to increase 11 percent (about 0.3 percent per year) to 176,000 vpd.

By 2040, increased traffic volumes will generally cause I-94 eastbound to operate at level of service D or E during the morning peak hour, while westbound I-94 will generally operate at level of service D to F (**Exhibit 1-18**). During the afternoon peak hour in 2040, both eastbound and westbound I-94 will generally operate at level of service D to F (**Exhibit 1-19**).

The areas noted in Section 1.3.5.1 as being at level of service E or F in 2009 will continue to have congestion problems in the future. Many of the locations that had level of service E in 2009 will degrade to level of service F by 2040. In addition, many more locations on I-94, US 41, and Miller Park Way will operate at a lower level of service in 2040.

1.3.6 Summary of the Purpose and Need for the Project

In summary, the purpose of the project is to address the deteriorated condition of I-94, obsolete roadway and bridge design, existing and future traffic demand, and high crash rates in the I-94 East-West Corridor from 70th Street (western terminus) to 16th Street (eastern terminus) in order to maintain it as a key link in the local, regional, state, and national transportation network. The configuration of the study area freeway system is functionally deficient in the following areas:

- Eight locations do not meet minimum standards for decision sight distance.
- Numerous locations have substandard shoulder widths.
- Sixteen bridges do not meet minimum vertical clearance standards.
- None of the interchanges meet design criteria for minimum spacing requirements between interchanges.
- Twelve locations do not meet minimum ramp spacing standards.
- Eleven locations have left-hand entrances or exits.
- Eighteen locations have substandard ramp taper rates.
- Ten entrance/exit ramps have inadequate acceleration/deceleration lengths.

Additionally, the horizontal alignment is substandard along most of the study corridor. In addition, there are several segments of the corridor where the existing design speed is less than the minimum recommended design speed based on stopping sight distance.

The most notable functional deficiencies are the closely spaced service interchanges and the combination of left- and right-hand entrance and exit ramps, which are contrary to driver expectations and result in major safety and operational problems, such as traffic weaving and congestion. When combined, all of the identified functional deficiencies create substandard conditions throughout the I-94 East-West Corridor, resulting in a substantially higher-than-average crash rate in many locations. Most segments of I-94 have

crash rates that are over two times higher than the statewide average for similar urban freeways. Current traffic volumes result in congestion and delays for all users of I-94. Anticipated development and redevelopment adjacent to I-94 will add additional traffic to the already congested freeway segment. By 2040, WisDOT and FHWA expect the level of service to be E or F, on a scale of A through F, for a majority of I-94 based on the traffic projections.

1.4 Local Government, Public, and Agency Input

WisDOT presented the key elements of the need for the project at public involvement meetings held on August 21 and 23, 2012. At the meetings, the public had the opportunity to review exhibits, see a presentation that illustrated the need for the project, and provide WisDOT with comments. Public comments focused on improving safety and traffic flow and maintaining existing access in the corridor.

On November 2, 2012, WisDOT sent the purpose and need section of this document to participating and cooperating agencies. WisDOT received responses from the National Park Service, USEPA, Corps of Engineers, VA National Cemetery Administration, WDNR, SEWRPC, and the City of Milwaukee (Appendix D). The update of the purpose and need section took into account input from the agencies.

During the Draft EIS availability period, some interest groups questioned the validity of WisDOT's traffic projections. These groups claim that AADT on I-94 in the project area is declining. Several sections of the Final EIS provide additional information to address the concerns and Section 6.4 provides a detailed response to the concerns.

1.5 Environmental Aspects

The I-94 East-West Corridor study must analyze and consider potential impacts to the human, natural, and built environment as part of the project development process, as required by state and federal law. The project purpose and need describes factors to consider in developing alternatives. Environmental impacts are also a factor in developing alternatives. The study area contains several resources, such as the Menomonee River, environmental corridors, wetlands, parks, neighborhoods, schools, historic properties, archaeological sites, churches, and cemeteries.

Transportation projects that affect resources protected under the Clean Water Act must address the Section 404(b)(1) of the Clean Water Act entitled "*Guidelines for Specification of Disposal Sites for Dredged or Fill Material*" and administered by USEPA and the Corps of Engineers. Section 404(b)(1) states that dredged or fill material should not be discharged into aquatic ecosystems, including wetlands, unless no practicable alternatives can be demonstrated; such discharge will not have unacceptable adverse impacts; and all practical measures to minimize negative effects are undertaken. The Corps of Engineers may adopt the EIS to fulfill its agency responsibilities pursuant to the National Environmental Policy Act of 1969 as a cooperating agency and in compliance with 40 CFR 1500-1508.

Section 4(f) of the Department of Transportation Act of 1966 (49 USC Section 303) stipulates that FHWA and other U.S. DOT agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites, unless the following conditions apply:

- There is no feasible and prudent alternative to the use of land.
- The action includes all possible planning to minimize harm to the property resulting from use.

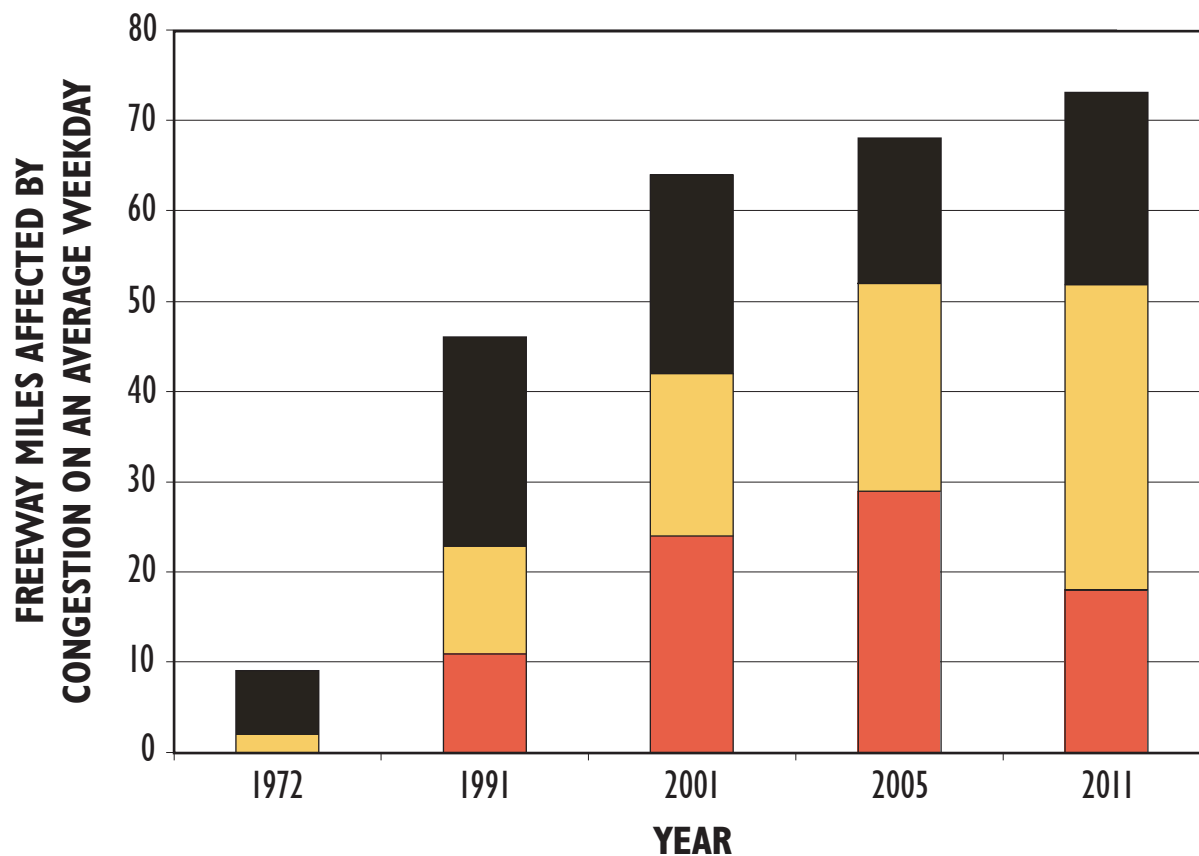
Sections 106 and 110 of the National Historic Preservation Act as amended (54 USC 306108 and 54 USC 306107a, respectively) require federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation reasonable opportunity to comment on such undertakings. The Section 106 process seeks to accommodate historic preservation concerns with the needs of federal undertakings through consultation among the agency official and other parties with an interest in the effects of the undertaking on historic properties.

1.6 Criteria to Evaluate Alternatives

The following are purpose and need factors that demonstrate the need for transportation improvements in the I-94 East-West Corridor:

- System linkage and route importance
- High crash rates
- Existing freeway conditions and deficiencies
- Existing and future traffic volumes

The project purpose and need sets the stage for developing and evaluating possible improvement alternatives. Additional factors considered in evaluating potential alternatives include resource agency input, local government input, public input, cost, and impacts to the human/natural environment.



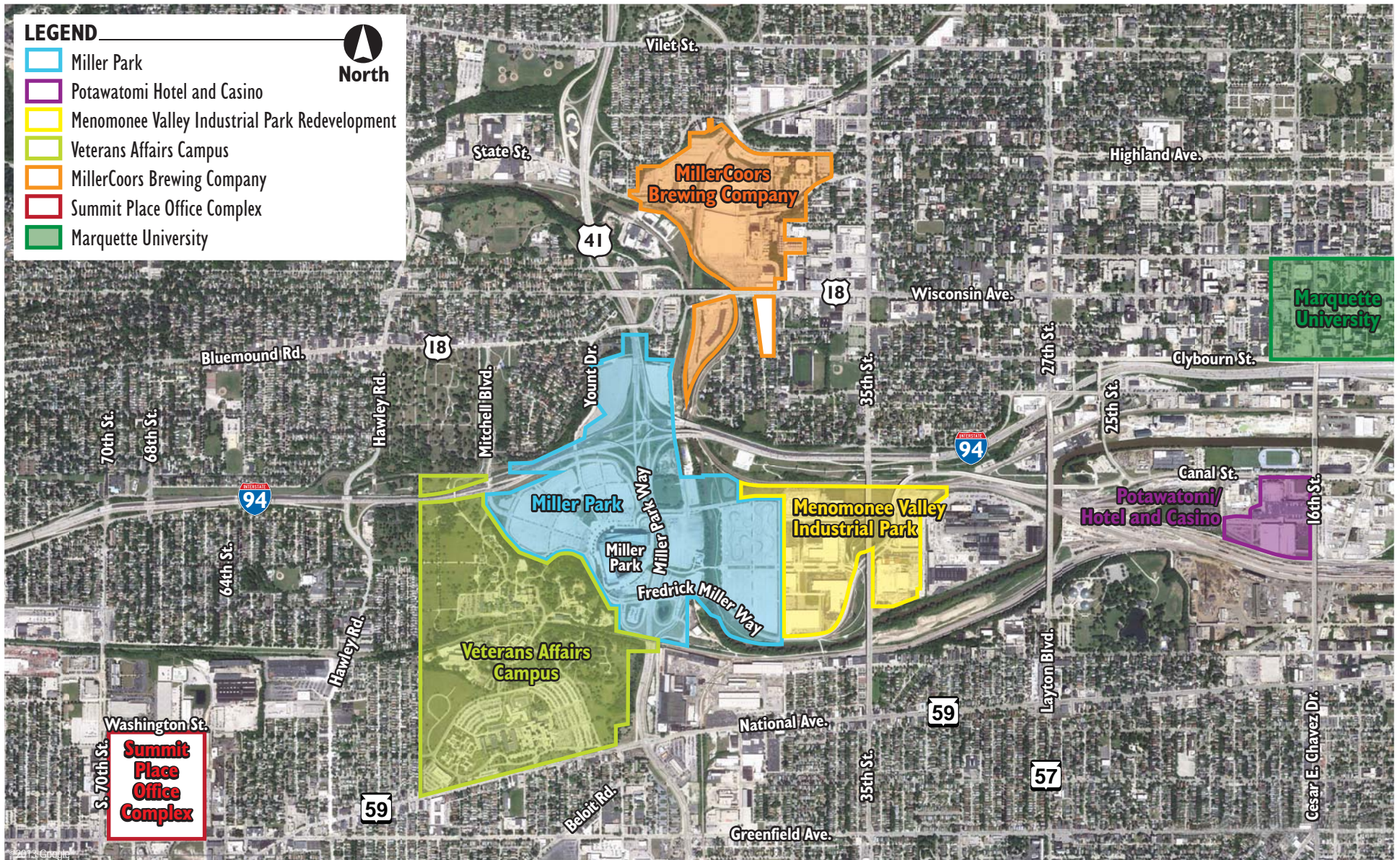
- Moderate Congestion** – Freeway segment experiences, for at least 1 hour in each direction on an average weekday, average travel speeds of 1 to 2 miles per hour below the free-flow speed, and substantial restrictions on the ability to maneuver and change lanes.
- Severe Congestion** – Freeway segment experiences, for at least 1 hour in each direction on an average weekday, average travel speeds up to 10 miles per hour below the free-flow speed with virtually no ability to maneuver and change lanes.
- Extreme Congestion** – Freeway segment experiences, for at least 1 hour in each direction on an average weekday, average travel speeds which are typically 20 to 30 miles per hour or less with breakdowns in traffic flow and stop-and-go bumper-to-bumper traffic.

Source: SEWRPC.

Exhibit I-2

Estimated Existing Southeastern Wisconsin Freeway System
Traffic Congestion on an Average Weekday

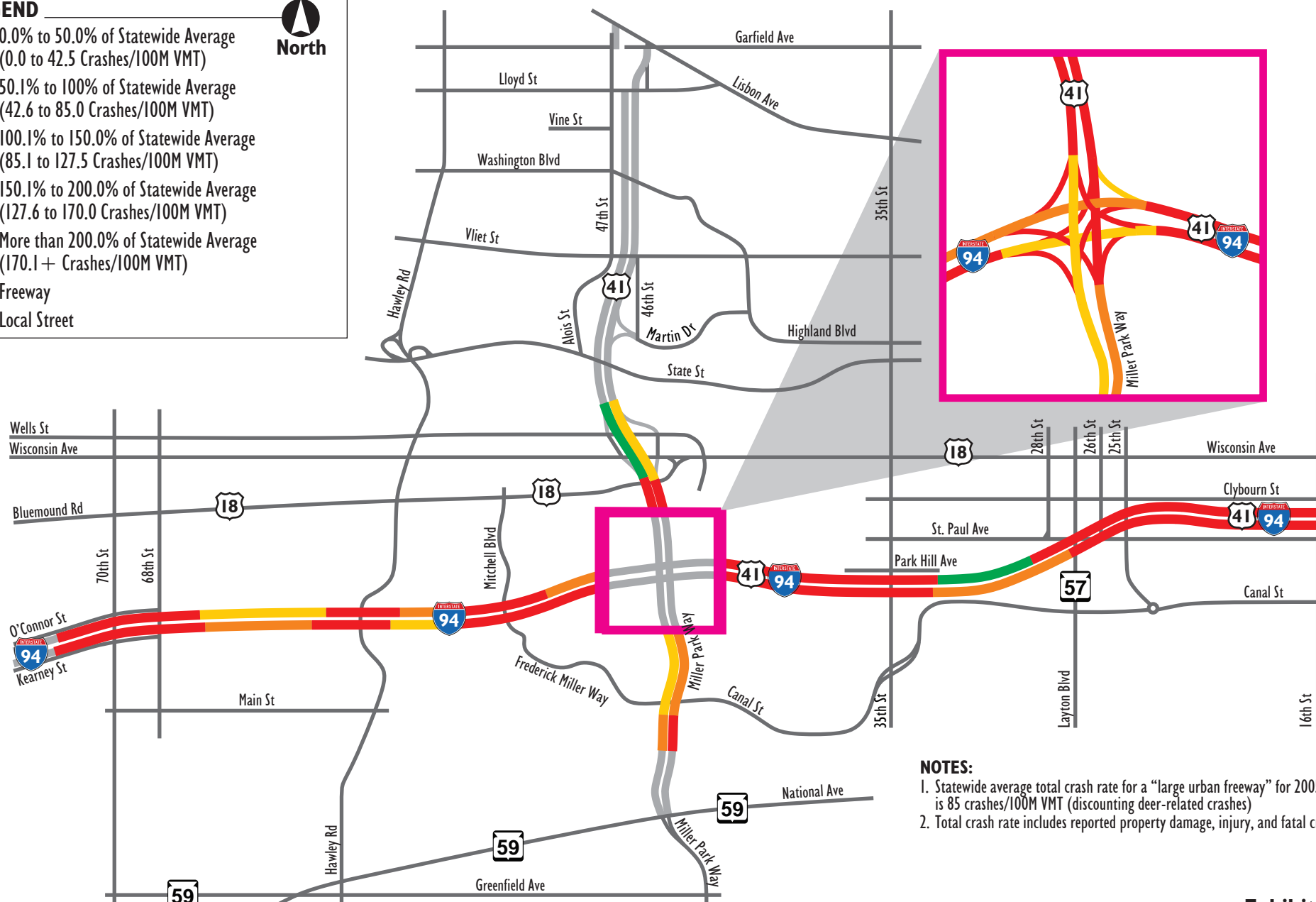




LEGEND

- 0.0% to 50.0% of Statewide Average
(0.0 to 42.5 Crashes/100M VMT)
- 50.1% to 100% of Statewide Average
(42.6 to 85.0 Crashes/100M VMT)
- 100.1% to 150.0% of Statewide Average
(85.1 to 127.5 Crashes/100M VMT)
- 150.1% to 200.0% of Statewide Average
(127.6 to 170.0 Crashes/100M VMT)
- More than 200.0% of Statewide Average
(170.1+ Crashes/100M VMT)

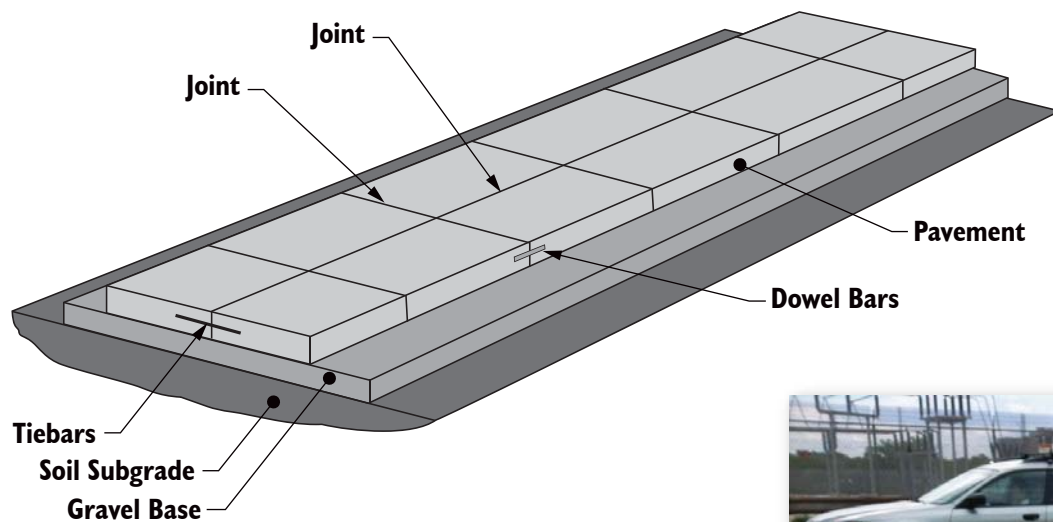
- Freeway
- Local Street



NOTES:

1. Statewide average total crash rate for a "large urban freeway" for 2005-2009 is 85 crashes/100M VMT (discounting deer-related crashes)
2. Total crash rate includes reported property damage, injury, and fatal crashes

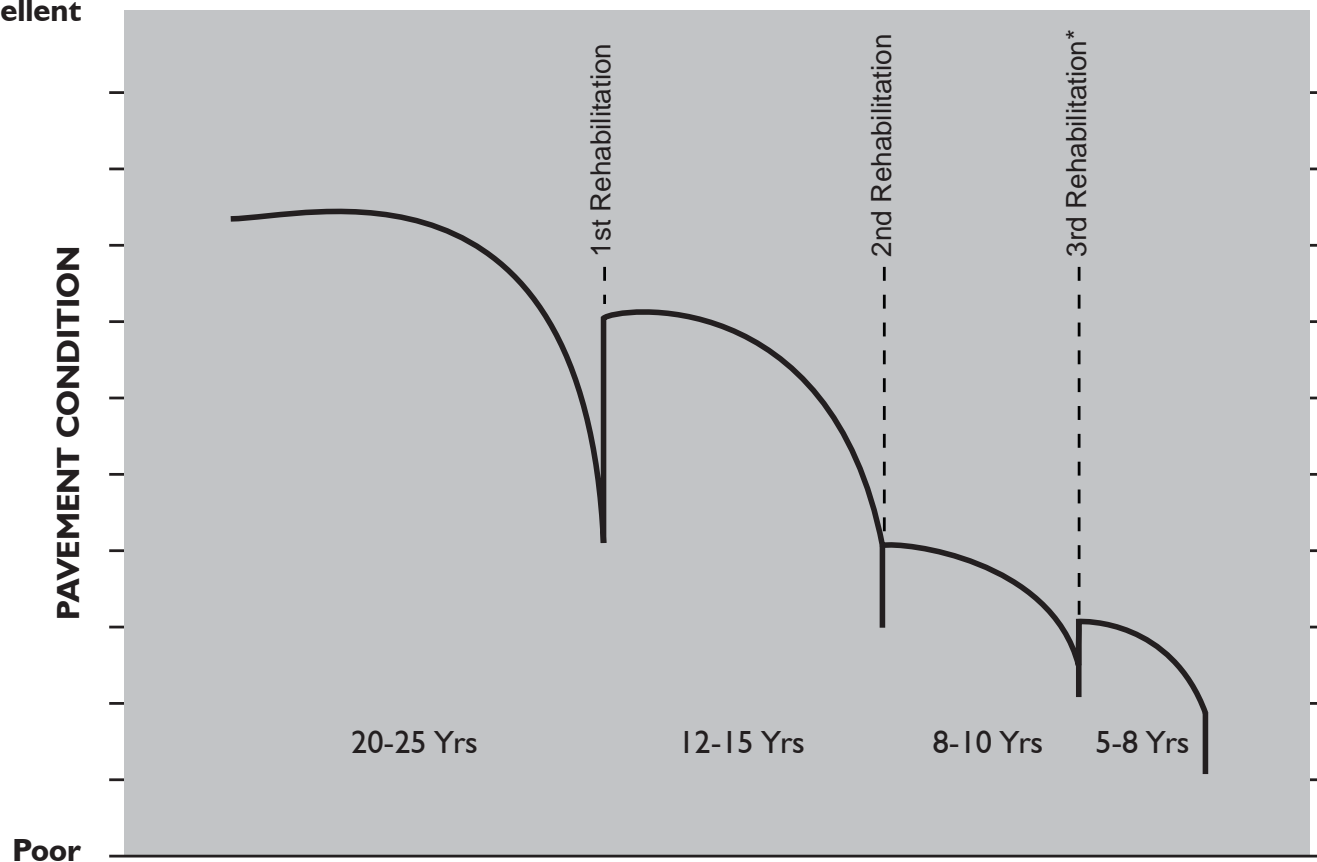




NOTE: This photo was taken during the 2012 resurfacing of the eastbound lanes of I-94. The photo illustrates the pavement components depicted in the graphic at left.



Excellent



* Many states decide to reconstruct in place of further rehabilitations



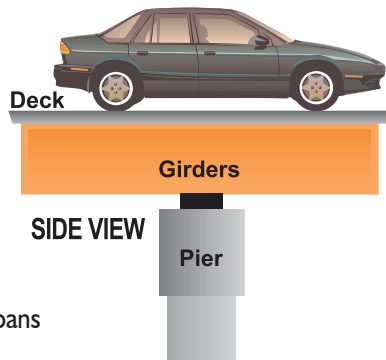
Exhibit I-6
Typical Pavement Life Cycle

Bridge Terminology

There are several types of construction designs for bridges.

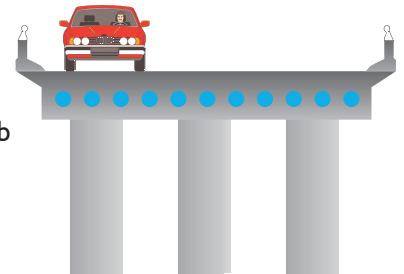
Most Wisconsin bridges have:

- Decks, the top surface of the bridge on which you drive
- Girders, the horizontal spans that rest on the piers
- Piers, the vertical columns that support the girders



Concrete voided slab

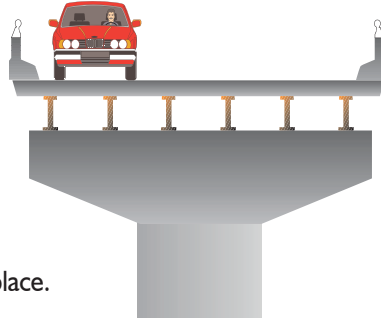
A concrete slab divided into a series of hollow circular cells that run parallel to the roadway inside of the slab. The slab serves the same purpose as a deck and girders in other bridge types.



Construction used in the I-94 East-West Corridor

Steel or concrete girder

A beam that supports the deck in traditional bridge design. Steel-girder bridges are simple and economical. When the deck wears out, it can be removed and replaced. The steel girders remain in place.



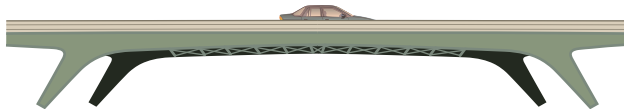
Concrete haunched slab

A continuous concrete slab that is tapered so that the thickest portion is over the piers and thinnest portion is the area between the piers.



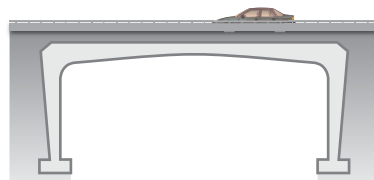
Steel “K” Frame

A steel frame resembling the letter “K” that supports the deck. The piers and girders are combined into two main load carrying members



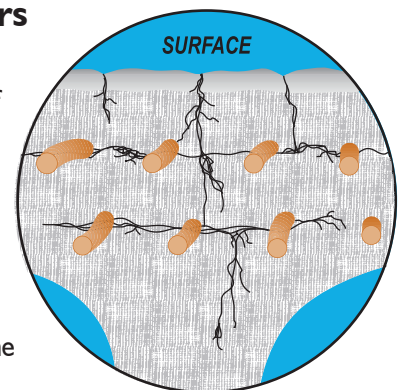
Concrete Rigid Frame Bridge

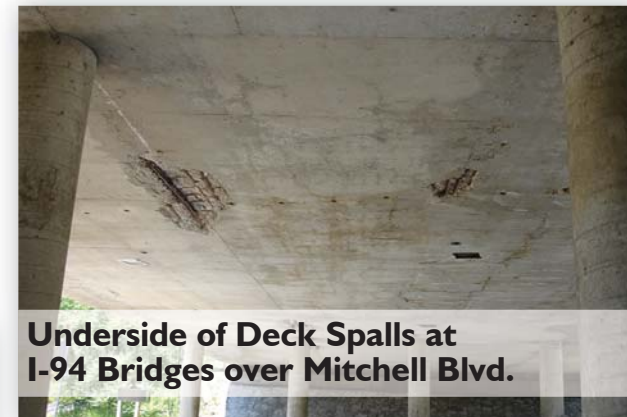
A bridge type in which the superstructure and substructure components are constructed in place as a single unit

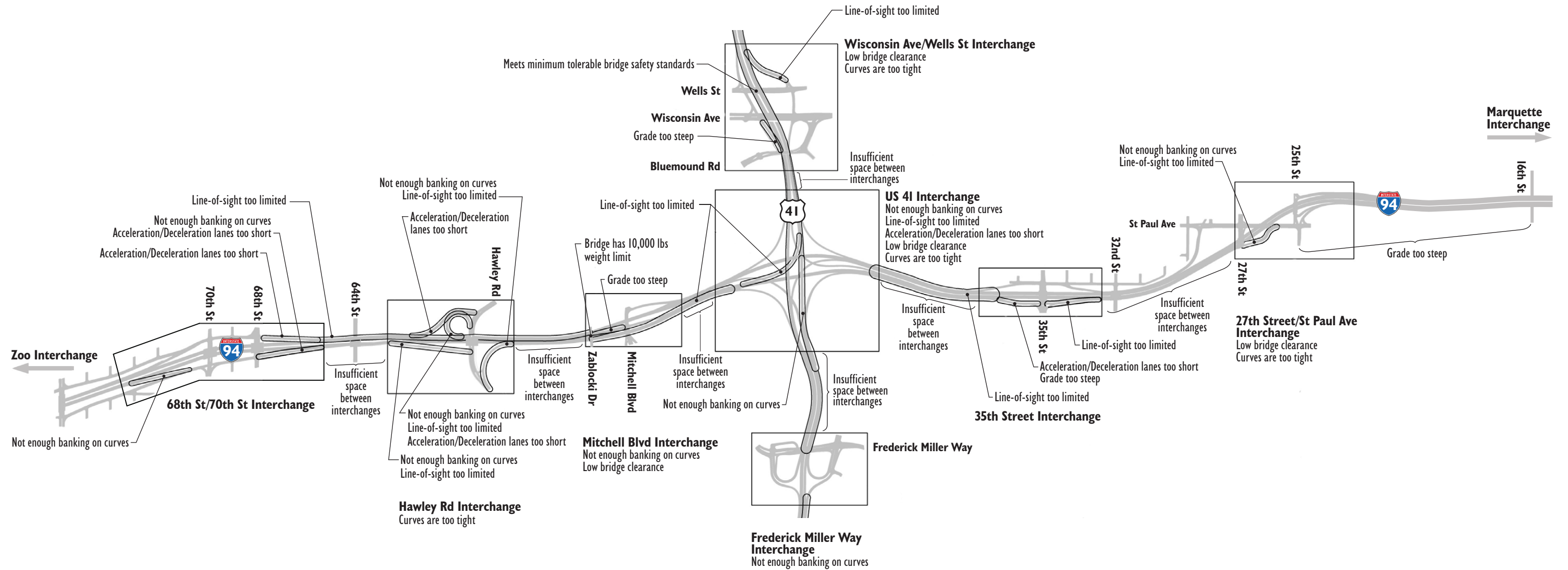


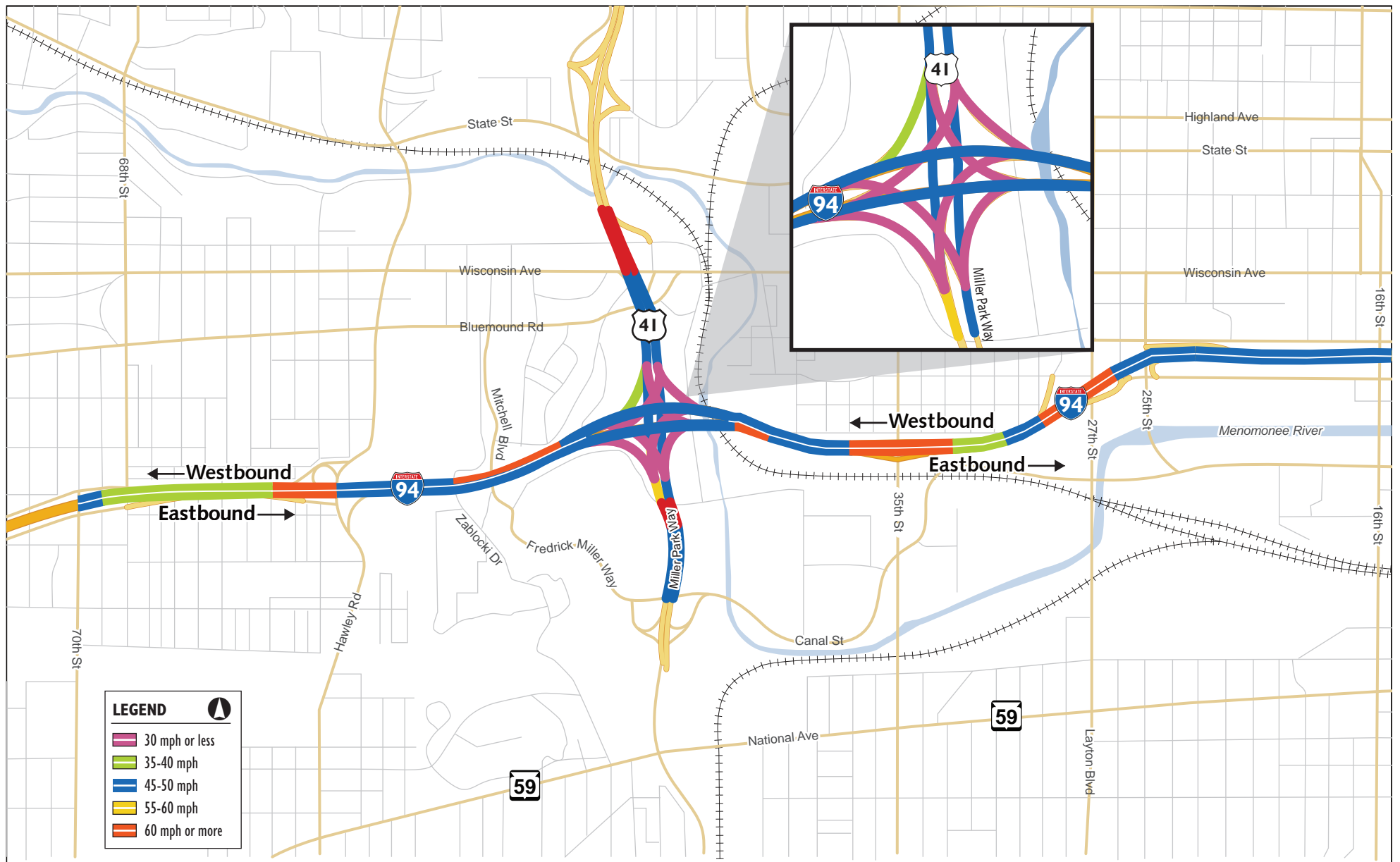
Reinforcing Bars

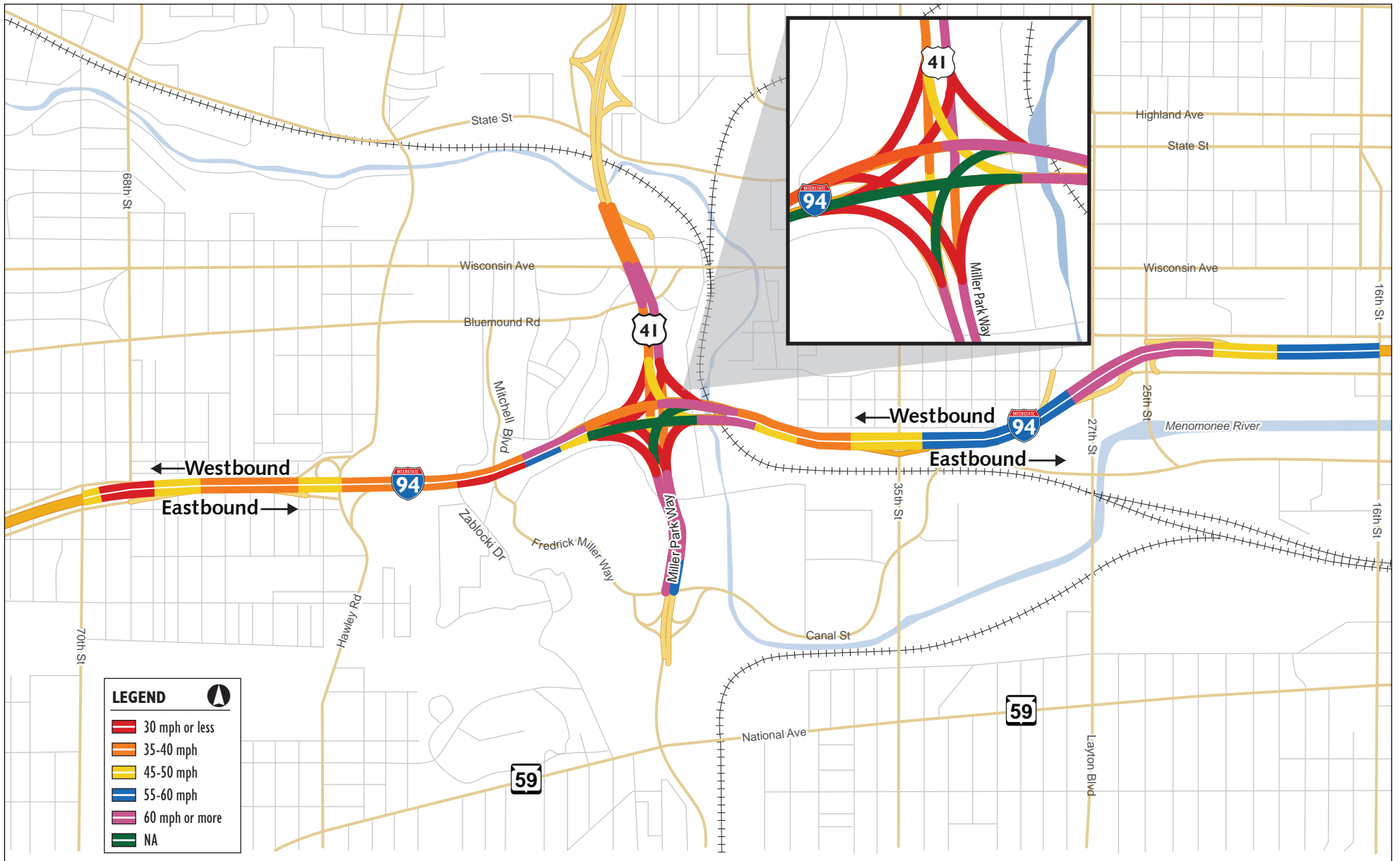
Concrete is typically poured over a lattice of steel reinforcing bars called “rebar.” Rebar gives concrete its strength and is used in concrete piers, girders, and decks. When cracks form in the deck allowing water to come in contact with the rebar, the rebar rusts and the concrete comes apart. New bridges have coated rebar to reduce rusting.











```
graph TD; LUP[Land Use Plan] -.-> TDM[Travel Demand Model]; TP[Transportation Plan] -.-> TDM; TDM --> DYT[Design Year Forecast Traffic Volumes];
```

The diagram illustrates the Travel Demand Model process. It begins with two input boxes at the top: "Land Use Plan" and "Transportation Plan", both connected by red dotted lines to a central box labeled "Travel Demand Model". This central box contains four sequential steps, each with a question and a corresponding model component: 1. "How many trips are occurring?" leads to "Trip Generation" (TG); 2. "Where are trips going to and coming from?" leads to "Trip Distribution" (TD); 3. "What method of travel?" leads to "Modal Choice" (MC); 4. "What route are trips taking?" leads to "Traffic Assignment" (TA). Red dotted lines connect these steps in sequence. Finally, a red dotted line connects the "Traffic Assignment" step to a bottom box labeled "Design Year Forecast Traffic Volumes".

Land Use Plan

Transportation Plan

Travel Demand Model

How many trips are occurring?

Trip Generation **TG**

+

Where are trips going to and coming from?

Trip Distribution **TD**

+

What method of travel?

Modal Choice **MC**

What route are trips taking?

Traffic Assignment **TA**

Design Year Forecast Traffic Volumes

The diagram illustrates the timeline for the I-94 E-W Project. It shows a sequence of three boxes connected by plus and equals signs. The first box, labeled 'Base Year', contains the text 'Construction begins' and the year '2020'. The second box contains '+ ≥20 Years ='. The third box, labeled 'Design Year', contains the text 'At least 20 years after construction begins' and the year '2040'.

Base Year		Design Year
Construction begins	+ ≥20 Years =	At least 20 years after construction begins
2020	I-94 E-W Project	2040

2030 TT 

2035 TT   Δ = Difference between 2030 and 2035

2040 TT   $2035 + \Delta = 2040$

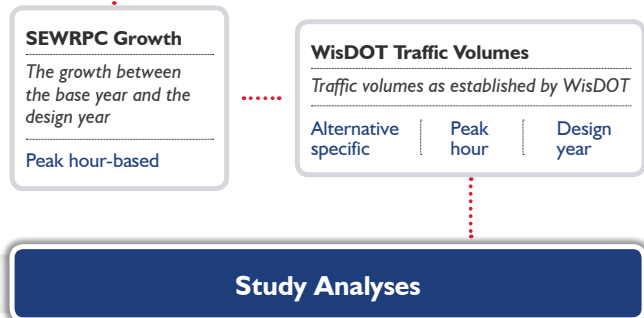
TA	TA	TA	TA
<p>No-Build Alternative</p> <p><i>No changes to current design and capacity</i></p>	<p>Eight lanes at-grade; no I-94 access</p> <p><i>No access to/from Hawley Rd</i></p>	<p>Eight lanes at-grade; partial I-94 access</p> <p><i>Access to/from Hawley Rd and I-94 west</i></p>	<p>Double deck alternative</p> <p><i>Eight lanes grade separated with full access to/from I-94</i></p>



Accepted Travel Demand Forecast

Diagram illustrating the types of analysis performed:

- Traffic microsimulation and capacity analysis
- Safety analysis
- Air quality analysis
- Noise impact analysis
- Construction analysis





Level of Service A



Level of Service D



Level of Service B



Level of Service E



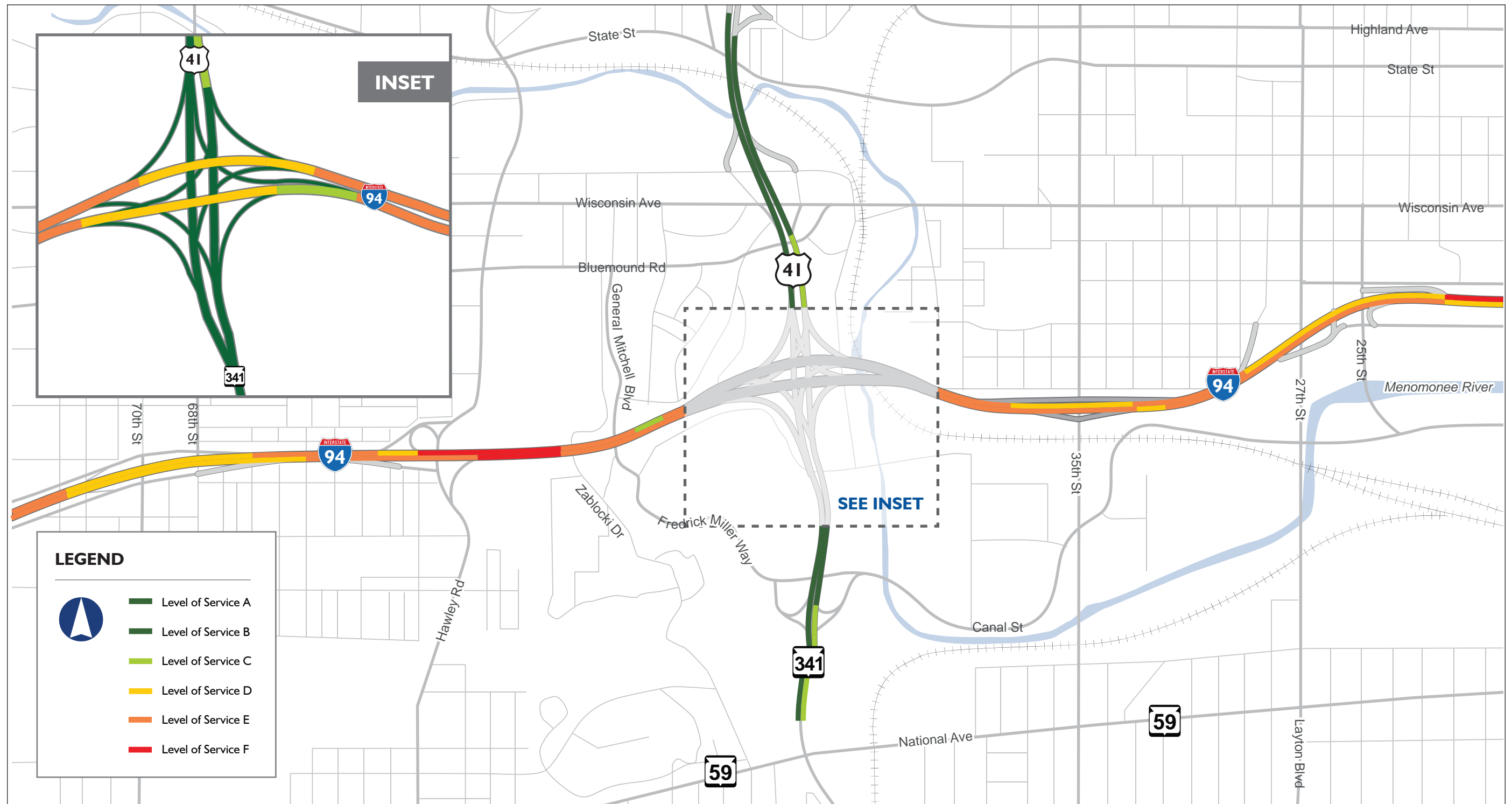
Level of Service C



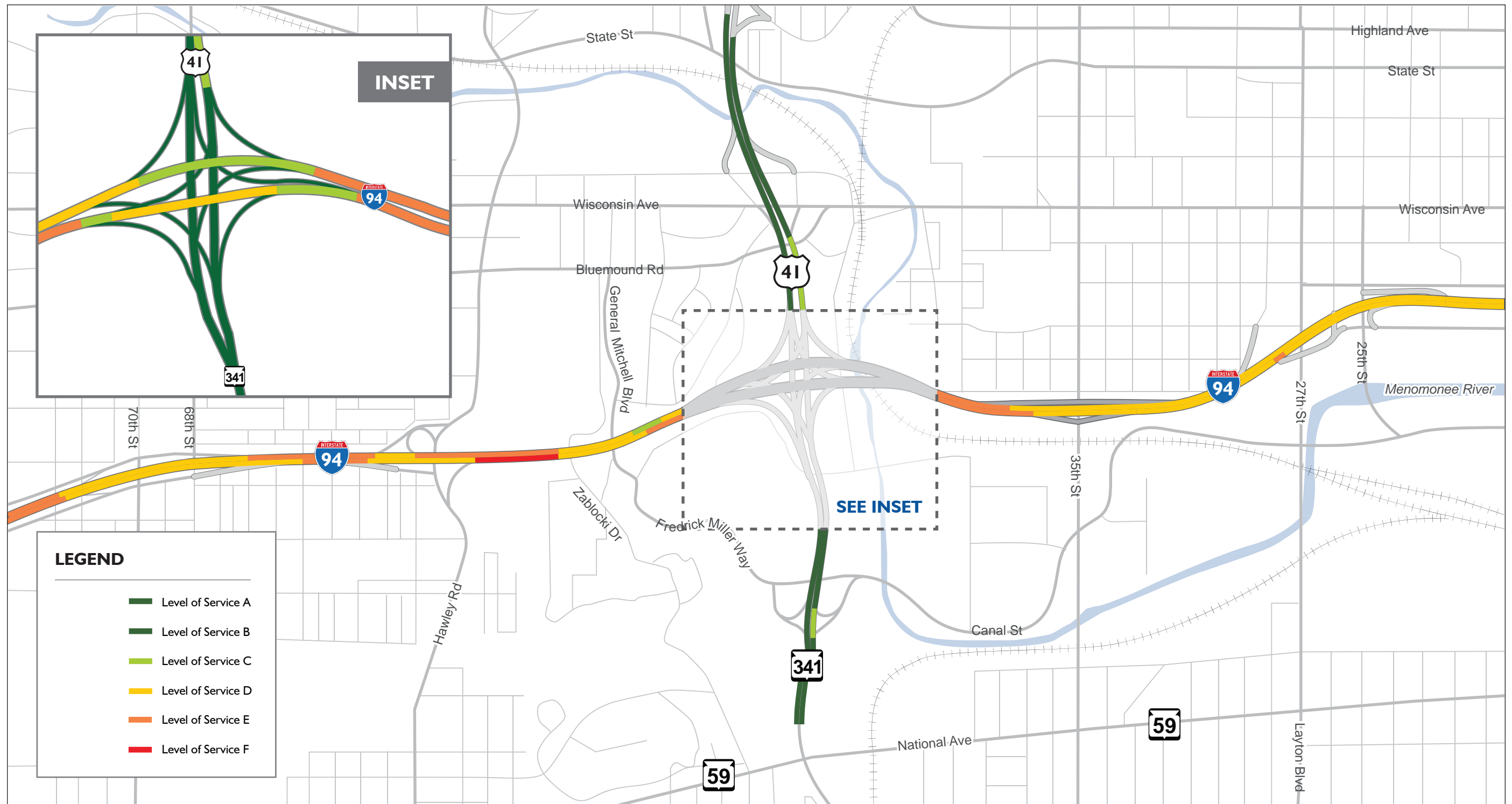
Level of Service F







NOTE: Level of service A and B are represented by the same color in order to draw more attention to areas with worse levels of service.



NOTE: Level of service A and B are represented by the same color in order to draw more attention to areas with worse levels of service.

LEGEND

Facility Congestion Status

- At or Under Design Capacity
- Moderately Congested
- Severely Congested
- Extremely Congested

SOURCE: SEWRPC

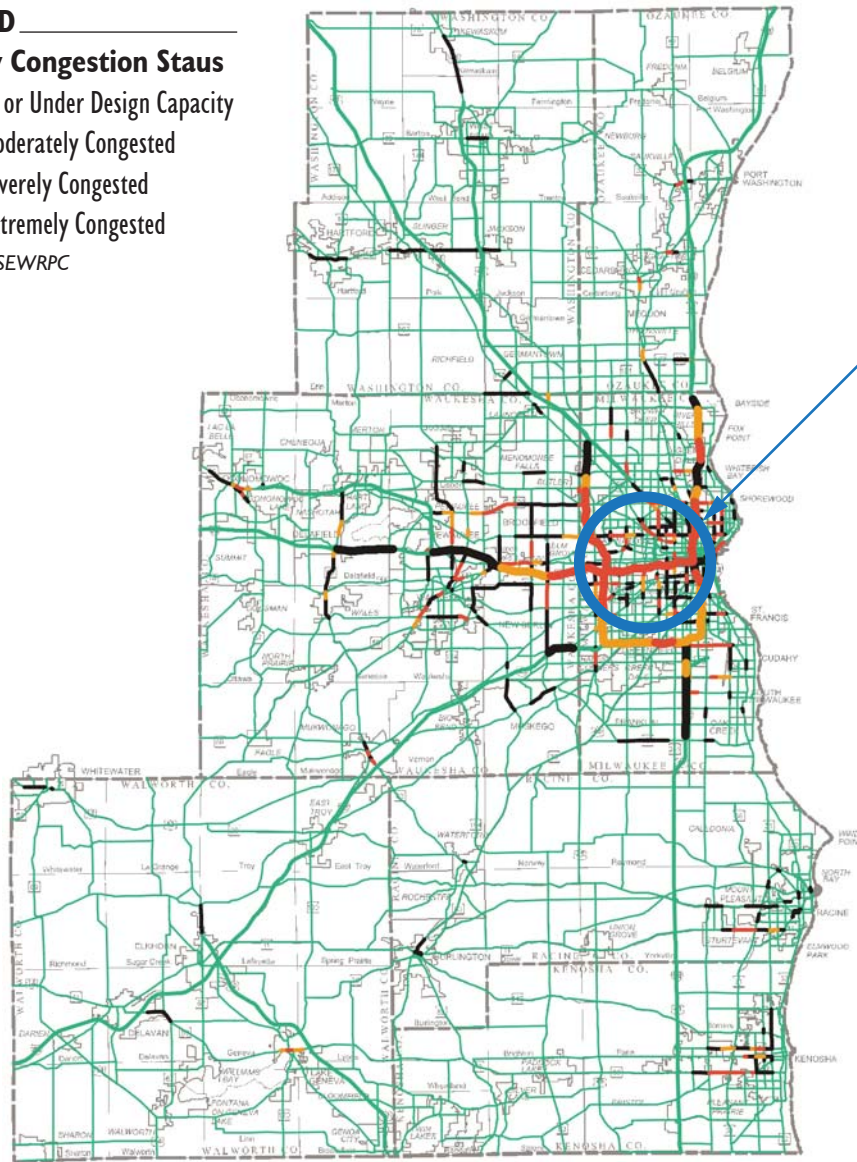


North

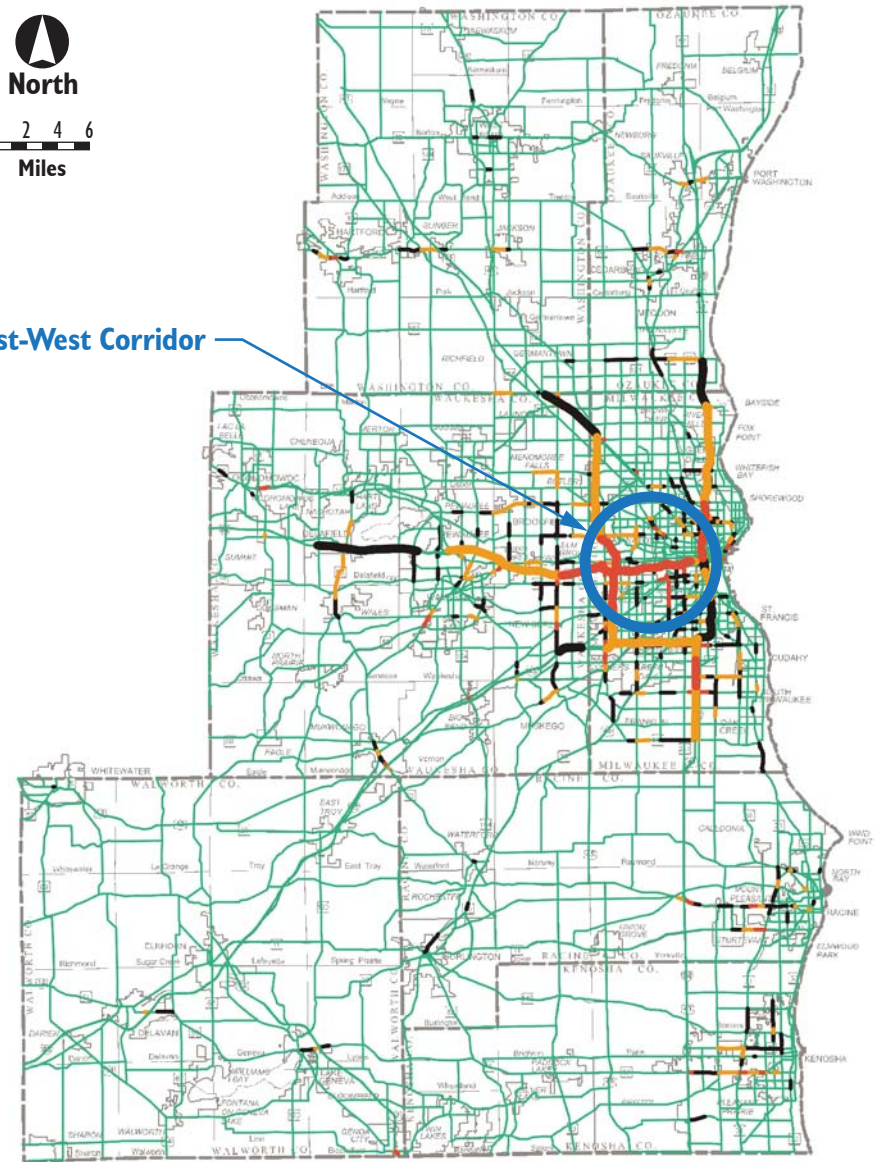
0 2 4 6

Miles

I-94 East-West Corridor



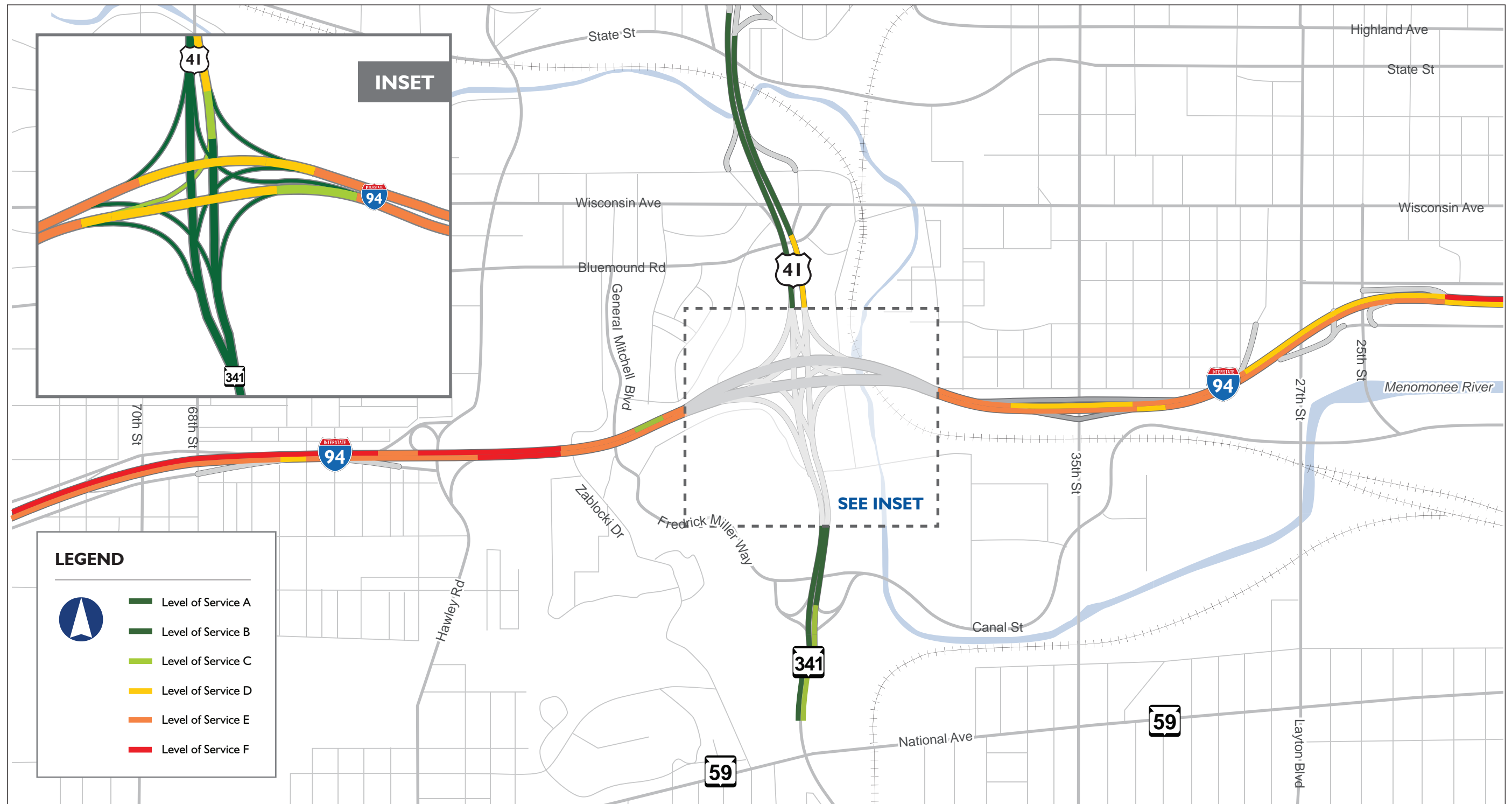
2001



2011^a

^a During 2011, the traffic volume on the freeway system was impacted by lane closures attendant to the resurfacing of IH 94 between STH 16 and the Stadium Interchange, and the reconstruction of the Mitchell Interchange.







NOTE: Level of service A and B are represented by the same color in order to draw more attention to areas with worse levels of service.

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- 2-20 West Segment Modernization Alternative W4 (Adjacent 2-Way Arterial)
- 2-21 Cemetery Segment Modernization Alternative C3 (3 Freeway Lanes, 2 C-D Lanes)
- 2-22 Cemetery Segment Modernization Alternative C4 (3 Freeway Lanes, 3 C-D Lanes)
- 2-23 Stadium Interchange Segment Modernization Alternative S1 (System Interchange—Stacked)
- 2-24 Stadium Interchange Segment Modernization Alternative S2 (System Interchange—Turbine)
- 2-25 Stadium Interchange Segment Modernization Alternative Modified S2 (System Interchange—Low-Speed Free Flow)
- 2-26 Stadium Interchange Segment Modernization Alternative S4 (Service Interchange—Single Point Interchange with C-D Road)
- 2-27 Stadium Interchange Segment Modernization Alternative S5 (Service Interchange—Modified Echelon Interchange)
- 2-28 Stadium Interchange Segment Modernization Alternative S6 (Service Interchange—US 41 Diamond with Event Partial Cloverleaf at 44th Street)
- 2-29 Stadium Interchange—Grade Separated Diverging Diamond Interchange
- 2-30 East Segment Other Alternatives Considered Typical Sections
- 2-31 East Segment Modernization Alternative E2 (C-D Roads)
- 2-32 East Segment Modernization Alternative E3 (Frontage Road)
- 2-33 East Segment Modernization Alternative E4 (No Interchange at 35th Street)
- 2-34 Typical Sections Comparison

Alternatives Considered/Preferred Alternative

Section 2 describes the range of alternatives developed to address the factors identified in Section 1, Purpose and Need for the Project, describes the basis for retaining alternatives for additional study or eliminating alternatives from consideration, and identifies WisDOT and FHWA's preferred alternative.

2.1 Section Overview

Section 2.2 examines the four build alternatives that were retained for detailed study for the I-94 East-West Corridor, and the No-build alternative (retained for comparative purposes). Each build alternative combines one of the following alternatives for each segment:

- West segment (70th Street to Yount Drive, just west of the Stadium Interchange):
 - Add a fourth lane in each direction, with either no Hawley Road interchange or a half interchange at Hawley Road (entrance/exit ramps to and from the west) and narrow lanes and shoulders through the cemetery area (**called the At-grade alternative**)
 - Add a fourth lane in each direction with full Hawley Road interchange and double deck (all up or partially down) through cemetery area (**called the Double Deck alternative**)
- East segment (Yount Drive to 16th Street):
 - Add a fourth lane in each direction, modified single-point interchange at Stadium Interchange and remaining nearly on-alignment east of 32nd Street (**called the On-alignment alternative**)¹
 - Add a fourth lane in each direction, modified single-point interchange at Stadium Interchange with an off-alignment segment east of 32nd Street (**called the Off-alignment alternative**)

An overview of each of the four alternatives is provided, along with a discussion of how the alternative meets the project's purpose and need. The impacts associated with the alternatives retained for detailed study are discussed in the appropriate resource categories in Section 3.

Section 2.3 identifies the project's preferred alternative and explains the evaluation process. After evaluating project purpose and need, cost, impacts to the human/natural environment, and public and agency comments received throughout the National Environmental Policy Act (NEPA) process and in direct response to the Draft EIS, **WisDOT and FHWA identified the At-grade alternative with the half interchange at Hawley Road in the west segment and the On-alignment alternative in the east segment as the preferred alternative.**

Section 2.4 establishes the foundation upon which WisDOT and FHWA developed the range of alternatives considered for the project. The section looks at the project in the context of the regional transportation planning process and how the alternatives considered for the project build upon that process and the recommendations made in *A Regional Transportation System Plan for Southeastern Wisconsin: 2035 SEWRPC Planning Report No. 49* (SEWRPC 2006a, updated and reaffirmed in June 2014).

Section 2.5 describes alternatives developed and evaluated by FHWA and WisDOT but ultimately dismissed from detailed consideration. The alternatives were assessed based on their ability to meet the project's purpose and need, as well as their cost, impacts, and public input. Section 2.5.5 describes **Modernization Alternatives** that were evaluated and dismissed from detailed consideration. Some alternatives were dismissed because they did not meet the project's purpose and need. Other alternatives meet the project's

¹ Although this alternative is referred to as "on-alignment," it would require right-of-way acquisition and commercial displacements on the south side of I-94. At its greatest extent, the On-alignment alternative's centerline/median would be located about 50 feet south of the existing I-94 centerline near 29th Street.

purpose and need but were dismissed because another alternative that also met the purpose and need had fewer impacts and/or a lower cost. Key information in Section 2.5 explains why the alternatives that remain under consideration in Section 2.2 were retained and those in Section 2.5 were eliminated, as well as the justification for doing so.

Section 2.6 provides an overview of the public and agency input on the alternatives received prior to the release of the Draft EIS. It notes the general themes heard from the public regarding the alternatives at the project's public involvement meetings (PIMs) and input from Technical Advisory Committee (TAC) meetings, Community Advisory Committee (CAC) meetings, and through meetings with neighborhoods and other stakeholders on the project. Section 2.6 also summarizes the comments received from the project's Cooperating and Participating Agencies regarding Section 2.

Finally, Section 2.7 provides an overview of the public and agency comments that were received regarding the alternatives during the availability period following the publication of the Draft EIS. Section 6 provides a more detailed summary of the comments and responses to them (Appendix E contains local, state, and federal agency comments on the Draft EIS, as well as a response to the comments).

2.2 Alternatives Retained for Detailed Study

WisDOT and FHWA developed and evaluated a wide range of alternatives for the project. The No-build alternative and four build alternatives remained under consideration after an extensive alternatives development and refinement process that began in 2012. The following were the four alternatives:

- At-grade (west segment) and On-alignment (east segment)
- At-grade (west segment) and Off-alignment (east segment)
- Double Deck (west segment) and On-alignment (east segment)
- Double Deck (west segment) and Off-alignment (east segment)

In the west segment (70th Street to Yount Drive, just west of the Stadium Interchange), both the At-grade alternative and the Double Deck alternative would have 8 lanes (4 in each direction). The Double Deck alternative would include interchanges at 68th Street/70th Streets and Hawley Road. The At-grade alternative would include an interchange at 68th Street/70th Streets and either no interchange at Hawley Road or

a half interchange at Hawley Road. The half interchange would have an entrance ramp to westbound I-94 and an exit ramp from eastbound I-94 to Hawley Road. There would be no westbound exit ramp or eastbound entrance ramp as part of the half interchange at Hawley Road option. For both alternatives, the existing interchange at Mitchell Boulevard would be removed and replaced with a new local road interchange at the Stadium Interchange.

In the east segment, both the On-alignment alternative and the Off-alignment alternative would have 8 lanes (4 in each direction), and both would have interchanges at the Stadium Interchange, 35th Street, at or near 27th Street, and a new local road interchange (44th/46th Streets) within the Stadium Interchange.

Section 2.4, Foundation of Alternatives Development, describes the alternative development process, and Section 2.5, Other Alternatives Considered and Dismissed, describes the alternative screening process. Key information in Section 2.5 explains the rationale for retaining these four alternatives while eliminating others.

Screening criteria for each alternative included the alternative's ability to meet the project purpose and need, ability to avoid and minimize impacts to the natural and built environment, construction cost, and input received from local governments, resource agencies, and the public. The analysis also considered

Minimizing Impacts

All of the build alternatives discussed in Section 2.2 and 2.5 were designed to avoid or minimize, to the extent practicable, impact to the adjacent environment. The study team analyzed the alternatives retained for detailed study in this section to determine if adjustments could be made to the design that would reduce impacts, while still meeting the project purpose and need. As a result, the alternatives retained for detailed evaluation minimize impacts while maintaining the goals of the project's purpose and need.

compliance with federal and state laws, such as Section 106 and Section 110(f) of the National Historic Preservation Act, Section 4(f) of the U.S. Department of Transportation Act, and Section 404 of the Clean Water Act.

Initially, the study area was divided into four segments (west, cemetery, Stadium Interchange, and east), and multiple alternatives were developed for each segment. After screening out many alternatives, WisDOT consolidated the four segments into a west segment and an east segment (**Exhibit 2-1**). Yount Drive, located at the western end of the Stadium Interchange, serves as the dividing line between the west and east segments. Through the alternatives screening process, two alternatives in both the west and east segments were retained for detailed study. The two east segment alternatives are interchangeable with the two west segment alternatives. For example, both the On-alignment and Off-alignment alternatives in the east segment are compatible with the Double Deck alternative in the west segment. The same holds true for the At-grade alternative. In February 2015, FHWA and WisDOT identified a preferred alternative for the I-94 East-West Corridor. **The preferred alternative incorporates the At-grade alternative with the half interchange at Hawley Road in the west segment and the On-alignment alternative in the east segment (Table 2-1).** The preferred alternative includes some local road improvements that are discussed in detail in Section 2.3.

Transportation System Management (TSM) measures and applicable Transportation Demand Management (TDM) measures would be implemented as part of the preferred alternative. A number of TSM elements, such as ramp metering, traffic detectors, freeway monitoring/advisory signs, and incident management, are already in place along the I-94 corridor in Milwaukee County, as described in Section 2.5.2. The travel demand forecasts used for the study assumed full implementation of the TSM elements that are recommended in the regional transportation plan, and the preferred alternative will include existing and potential additional project-specific TSM elements. WisDOT will assess whether, and which, additional TSM elements, such as dynamic traffic management tools to warn drivers of closed lanes in the narrow cemetery area, may be added to the freeway during the final design phase.

TDM measures, such as park-and-ride lots and rideshare promotion, are in place along the I-94 corridor in Milwaukee County. The measures will remain in place for the preferred alternative. For TDM elements, WisDOT evaluated the transit projects included in the regional transportation plan to assess whether implementing them could satisfy the need to add capacity on I-94 in the study area. WisDOT evaluated this by assessing traffic operations on a 6-lane Modernization Alternative to determine if it would operate at an acceptable level of service (D or better) in the design year peak hour, assuming all the regional plan's recommended transit projects were included. The results of the analysis indicated that several segments of I-94 would operate at level of service E and F if a 6-lane Modernization Alternative and all transit projects from the regional transportation plan were implemented (see Section 2.5.5.1).

Sections 2.5.2 and 2.5.3 discuss why TSM and TDM measures would not meet the project's purpose and need as a stand-alone alternative.

WisDOT presented the build alternatives to the public at informational meetings and the public hearing in 2013 and 2014. WisDOT also presented the alternatives to the CAC and TAC in 2013 and 2014. The CAC is made up of representatives from neighborhoods adjacent to I-94 and other community groups. The TAC is made up of public works and planning officials from the City of Milwaukee, Wauwatosa, West Allis, West Milwaukee, and Milwaukee County. See Sections 2.6 and 2.7 for a summary and Sections 5 and 6 for additional detailed information about agency and public input on alternatives.

TABLE 2-1

Timeline of Alternatives Retained for Detailed Study

May 2013 (Draft Section 2 Sent to Agencies for Review)		July 2013 PIM and January 2014 Agency Coordination Meeting		April 2014		June 2014 PIM (Alternatives Retained for Detailed Study in Draft EIS)		February 2015 Preferred Alternative	
West Segment - Split Diamond at 68 th /70 th Streets with Braided Ramps - Split Diamond at 68 th /70 th Streets with Collector-Distributor (C-D) Roads - Split Diamond at 68 th /70 th Streets		West Segment - Split Diamond at 68th/70th Streets with Braided Ramps - Split Diamond at 68 th /70 th Streets with C-D Roads - Split Diamond at 68 th /70 th Streets		West Segment - Split Diamond at 68 th /70 th Streets with C-D Roads - Split Diamond at 68 th /70 th Streets		West Segment Remaining Alternatives: - At-grade (Split Diamond at 68 th /70 th Streets with At-grade Alignment with Narrow Lanes and Shoulders through Cemetery Area) - No interchange at Hawley Road - Half interchange at Hawley Road - Double Deck (Split Diamond at 68 th /70 th Streets with C-D Roads and Double Deck (All Up or Partially Down) through Cemetery Area)		West Segment Preferred Alternative: - At-grade (Split Diamond at 68 th /70 th Streets with At-grade alignment with narrow lanes and shoulders through the cemetery area) - No interchange at Hawley Road - Half interchange at Hawley Road - Washington Street connection between 70th Street and Hawley Road/60th Street - Local road intersection improvements - 70th Street/Greenfield Avenue - National Avenue/Greenfield Avenue - Miller Park Way/National Avenue - Double Deck (Split Diamond at 68th/70th Streets with C-D Roads and Double Deck (All Up or Partially Down) through Cemetery Area)	
Cemetery - At-grade (narrow lanes and shoulders) - Double Deck - All Up - Partially Down - All Down		Cemetery - At-grade (Narrow Lanes and Shoulders) - Double Deck - All Up - Partially Down - All Down		Cemetery - At-grade (Narrow Lanes and Shoulders) - Double Deck - All Up - Partially Down - All Down					
Stadium Interchange - Low-speed Free-Flow System Interchange - Modified Single-point Interchange with Free-Flow Ramps from I-94		Stadium Interchange - Low-speed Free Flow System Interchange - Modified Single-point Interchange with Free-Flow Ramps from I-94		Stadium Interchange - Modified Single-point Interchange with Free-Flow Ramps from I-94		East Segment Remaining Alternatives: - Modified Single-point Interchange at Stadium Interchange with Off-alignment, Braided Ramps alternative East of 32 nd Street - Modified Single-point Interchange at Stadium Interchange with nearly On-alignment, Braided Ramps alternative East of 32 nd Street		East Segment Preferred Alternative: - Modified Single-point Interchange at Stadium Interchange with nearly On-alignment, Braided Ramps Alternative East of 32 nd Street - Modified Single-point Interchange at Stadium Interchange with Off-alignment, Braided Ramps Alternative East of 32nd Street	
East Segment		East Segment		East Segment					
<i>Alignment</i>	<i>Ramps</i>	<i>Alignment</i>	<i>Ramps</i>	<i>Alignment</i>	<i>Ramps</i>				
- Off-alignment	Braided Ramps	- Off-alignment	Braided Ramps	- Off-alignment	Braided Ramps				
- Split Alignment		- Split Alignment	Split Diamond with Frontage Roads	- On-alignment	Split Diamond with Frontage Roads				
- On-alignment	Split Diamond with Frontage Roads	- On-alignment		- On-alignment					

~~Red strike through~~ means that the alternative was eliminated from consideration at that stage in the project development process. **Green** means that the alternative was added at that stage. **Purple** represents traffic mitigation measures that are included as part of the At-grade alternative with half interchange at Hawley Road (preferred alternative).

As part of the I-94 East-West Corridor project, WisDOT will accommodate bicycle and pedestrian facilities where practicable in accordance with the *United States Department of Transportation Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations* (U.S. DOT, 2010)² and *FHWA Guidance: Bicycle and Pedestrian Provisions of Federal Transportation Legislation* (FHWA, 2015). This policy statement and guidance encourages state DOTs and other agencies to design roadway right-of-way to enable safe access for all users through including bicycle facilities and pedestrian walkways. Design standards are included in the AASHTO design manuals.

I-94 and the interchange ramps in the study area are exempt because bicycles and pedestrians are prohibited on these roadways per WisDOT requirements. However, for any local roadways reconstructed as part of this project, per Wisconsin State Statute 84.01(35), WisDOT will give due consideration to pedestrian and bicycle facilities, where practicable and consistent with U.S. DOT policy. Section 2.3 notes where key exceptions would be required.

2.2.1 No-build Alternative

The No-build alternative would include no safety improvements, capacity improvements, or pavement replacement, but only maintenance and minor improvements. While the No-build alternative would not meet the purpose and need for the project, it does serve as a baseline for a comparison of impacts related to the build alternatives.

Pavement maintenance and minor improvements over time would not address the purpose and need for the project with respect to safety concerns, existing highway deficiencies, and future traffic demand. Furthermore, it would not be consistent with regional transportation system plans that document the importance of I-94 for moving people, goods, and services, and a regional transportation system meeting the travel needs of southeastern Wisconsin.

The No-build alternative would not address the following project purpose and need factors:

- *Maintain a key link in the local, state, and national transportation network.* More frequent and extensive maintenance would disrupt travel along I-94.
- *Address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes.* This alternative would not address substandard design elements identified in Section 1 that contribute to crashes, such as left-hand entrances/exits.
- *Replace deteriorating pavement.* Existing pavement would continue to deteriorate, requiring more frequent and extensive maintenance.
- *Accommodate existing and future traffic volumes at an acceptable level of service.* This alternative would not sufficiently accommodate existing and future traffic volumes.

No local governments support this alternative, but some members of the public and elected officials advocated leaving the freeway as-is, primarily as a way to keep all the existing access points and avoid any impacts.

2.2.2 Alternatives Retained for Detailed Study in Draft EIS

Section 2.2.2 examines the four build alternatives that were retained for detailed study for the I-94 East-West Corridor Draft EIS, released in November 2014. **In February 2015, WisDOT and FHWA identified**

² From U.S. DOT Policy Statement on Bicycle and Pedestrian Accommodation Regulations and Recommendations, signed March 11, 2010, and announced March 15, 2010: "The United States Department of Transportation (DOT) is providing this Policy Statement to reflect the Department's support for the development of fully integrated active transportation networks. The establishment of well-connected walking and bicycling networks is an important component for livable communities, and their design should be a part of Federal-aid project developments. Walking and bicycling foster safer, more livable, family-friendly communities; promote physical activity and health; and reduce vehicle emissions and fuel use. Legislation and regulations exist that require inclusion of bicycle and pedestrian policies and projects into transportation plans and project development. Accordingly, transportation agencies should plan, fund, and implement improvements to their walking and bicycling networks, including linkages to transit."

the At-grade alternative with the half interchange at Hawley Road in the west segment and the On-alignment alternative in the east segment as the preferred alternative.

TSM measures and applicable TDM measures would be implemented as part of the preferred alternative. A number of TSM elements, such as ramp metering, traffic detectors, freeway monitoring/advisory signs, and incident management, are already in place along the I-94 corridor in Milwaukee County and are part of the preferred alternative. TDM measures, such as park-and-ride lots and rideshare promotion, are in place along the I-94 corridor in Milwaukee County and will continue to be under the preferred alternative.

The regional transportation plan identifies the need for capacity expansion of I-94 in the study area. However, even with a demonstrated need for capacity expansion at the regional level, project-specific non-capacity expansion improvements, including public transit, are still considered by WisDOT to determine whether the purpose and need for the project could be met without capacity expansion. Public transit recommendations are also considered in order to ensure that the preferred alternative will not preclude planned transit improvements and will allow implementation of regional transportation plan recommendations of benefit to public transit that can be considered within the scope of this project, such as HOV lanes at freeway entrance ramps.

WisDOT is encouraging the implementation of transit in the Milwaukee area. The Modernization Alternatives for the I-94 East-West Corridor study do not preclude transit. WisDOT has committed to financially participate in the planning process of Milwaukee County's BRT study connecting downtown Milwaukee with the Milwaukee Regional Medical Center. A SEWRPC newsletter providing additional information on this BRT study can be found here:

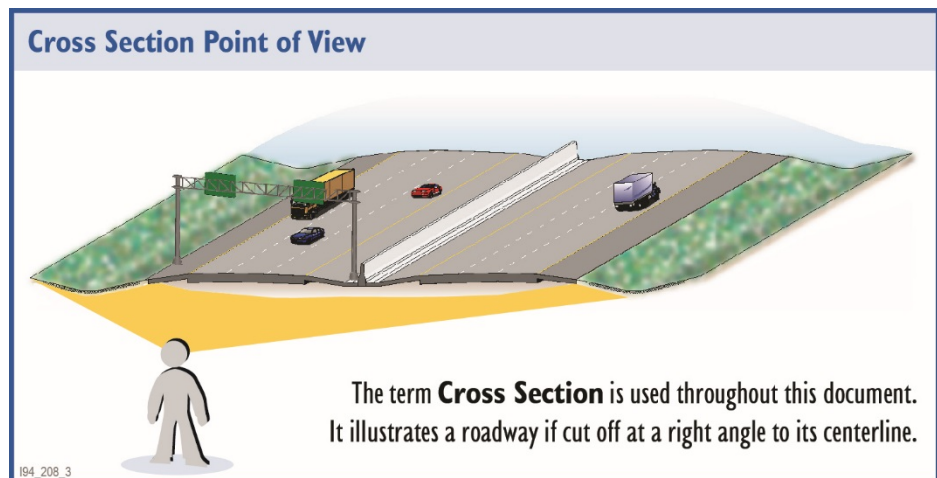
<http://campaign.r20.constantcontact.com/render?ca=a9825550-3247-46aa-a8f7-501e9f74a00e&c=fbae8110-014b-11e4-a9f3-d4ae5292c3f3&ch=fbb3ff50-014b-11e4-a9f3-d4ae5292c3f3>.

In addition, WisDOT has committed to using traffic mitigation funding before and during construction of the I-94 East-West corridor to invest in local intersection infrastructure. The intent of this investment is to incrementally implement BRT so that a sustainable BRT system is developed and available as a transportation option during I-94 construction. Additionally, WisDOT provides a subsidy for the Amtrak Hiawatha train route between Milwaukee and Chicago and is reconstructing the passenger train concourse at the Milwaukee Intermodal Station, which involves removal of the existing train shed and construction of a new, more welcoming structure designed for Americans with Disabilities Act (ADA) requirements.

Even with TSM and TDM measures as part of the preferred alternative and additional transit measures, there is a need for additional lanes on I-94.

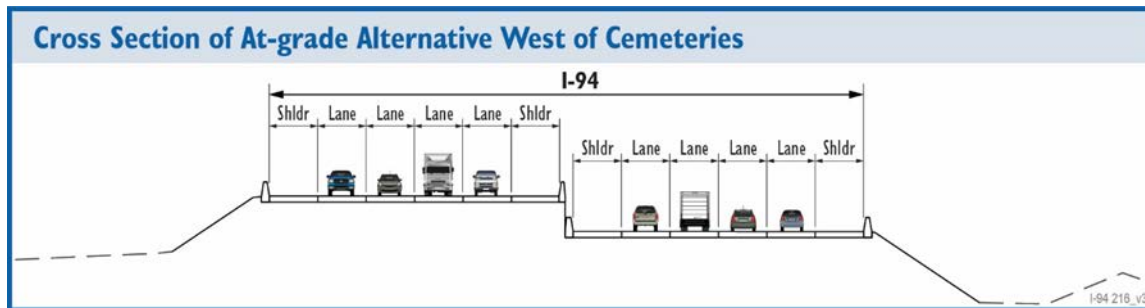
2.2.2.1 West Segment

The west segment of the study area is I-94 from 70th Street to Yount Drive, just west of the Stadium Interchange (see **Exhibit 2-1**). This segment includes the existing 68th Street/70th Street, Hawley Road, and the existing Mitchell Boulevard service interchanges. All alternatives were developed to avoid a direct impact on the cemeteries (Beth Hamedrosh Hagodel Cemetery, Spring Hill Cemetery, and Wood National Cemetery) adjacent to I-94 in this segment.



At-grade Alternative (half interchange at Hawley Road [*preferred alternative*] or no interchange at Hawley Road)

The At-grade alternative would reconstruct I-94 to 8 travel lanes (4 in each direction) at essentially the same elevation as the existing freeway (**Exhibit 2-2**). The At-grade alternative would be compatible with either alternative in the east segment. To avoid encroachment on the cemeteries, the reconstructed I-94 would have less than 12-foot driving lanes and narrow shoulders in the approximate 2,000-foot segment between the adjacent cemeteries (Hawley Road to Zablocki Drive). East and west of the cemeteries, the freeway would have standard 12-foot lanes and 12-foot shoulders.



At its narrowest point, roughly 110 feet would be available for the construction footprint of I-94 between the cemeteries. Lane widths would be as narrow as 11 feet for a short distance (**Exhibit 2-3**). For the At-grade alternative with a half interchange at Hawley Road, eastbound and westbound traffic would travel in 11-foot lanes for roughly 30 feet in each direction³. The lanes would transition from 12 feet to 11 feet for several hundred feet east and west of the 11-foot-lane segment. For eastbound traffic, the transitions from 12- to 11-foot lanes would be roughly 780 feet to the west and 800 feet to the east of the short section of 11-foot lanes. For westbound traffic, the transition from 12- to 11-foot lanes would be roughly 580 feet to the west of the short section of 11-foot lanes and 890 feet to the east.

The shoulder widths would vary in this segment as the available right-of-way varies (the shoulders would be as narrow as 2 feet). For eastbound traffic, the outside shoulder would transition from 12 feet to 8 feet for 85 feet and then would consist of a shoulder width of between 2 and 8 feet for the next 1,230 feet. The outside shoulder width would transition from 8 feet to 12 feet over the next 75 feet. The eastbound inside shoulder would transition from 12 to 8 feet for 230 feet and then between 2 and 8 feet wide for the next 950 feet. The inside shoulder width would transition from 8 to 12 feet over the next 280 feet.

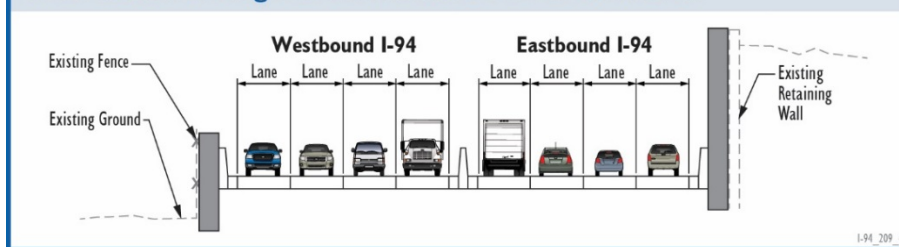
For westbound traffic, the outside shoulder would transition from 12 to 8 feet for 55 feet and then would be between 2 and 8 feet for the next 960 feet before transitioning immediately back to 12 feet. The westbound inside shoulder would transition from 12 to 8 feet for 270 feet and then would be between 2 and 8 feet for the next 990 feet. The inside shoulder width would transition from 8 to 12 feet over the next 220 feet.

To summarize, for eastbound traffic, there would be less than 12-foot lanes for about 1,610 feet, less than 12-foot inside shoulder for 1,460 feet, and less than 12-foot outside shoulder for 1,390 feet. For westbound traffic, there would be less than 12-foot lanes for about 1,500 feet, less than 12-foot inside shoulders for 1,480 feet, and less than 12-foot outside shoulders for 1,010 feet. **Exhibit 2-3** provides a visual summary of the distances described in this section.

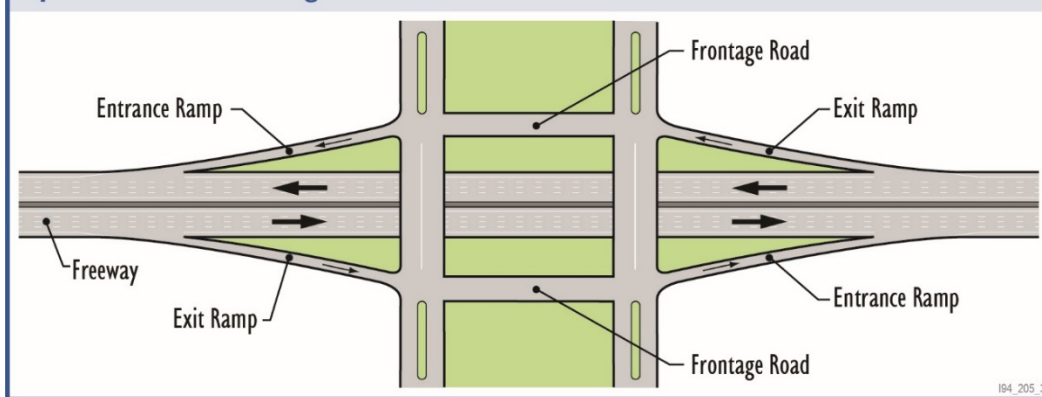
Dynamic traffic management tools to warn drivers of closed lanes in the narrow segment, advance warning signs alerting drivers to the narrow lanes and narrow shoulders, and other tools like reflectors on the center median barrier wall and the outside barrier wall would likely be implemented to make the narrow lane/narrow shoulder segment as safe as possible.

³ In the Draft EIS, it was noted that 11-foot lanes would be required for 121 feet for eastbound I-94 and 42 feet for westbound I-94. The distances were reduced due to refined design, specifically, maximizing the lane width transitions to keep the lanes as wide as possible, given available space.

Cross Section of At-grade Alternative Between Cemeteries



Split Diamond Interchange

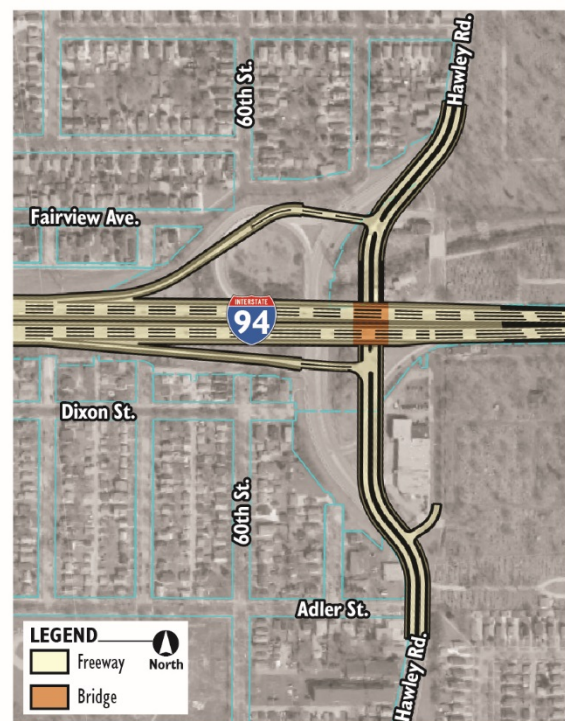


The 68th Street/70th Street interchange would be reconstructed in its current configuration (a split diamond interchange). Entrance and exit ramps would be longer than the existing ramps to provide more room for traffic entering and exiting the freeway, improving safety and traffic operations. 64th Street would continue to pass under I-94.

The At-grade alternative was analyzed having either no interchange at Hawley Road or a half interchange at Hawley Road. The half interchange would have an entrance ramp to westbound I-94 and an exit ramp from eastbound I-94 to Hawley Road. There would be no westbound exit ramp or eastbound entrance ramp as part of the half interchange at Hawley Road option. The reason for no interchange or a half interchange is that any entrance or exit ramps east of Hawley Road would impact the cemeteries and result in the relocation of graves.

FHWA's long-standing policy is to provide either a full interchange or no interchange at crossroads. FHWA considers half interchanges in "rare and extraordinary circumstances" (FHWA 2010⁴). FHWA does offer some flexibility to justify not meeting interchange standards if there are no reasonable alternatives to meeting standards. Extensive environmental impacts and/or extreme costs are often factors that are taken into consideration when evaluating reasonable alternatives. While FHWA gives appropriate consideration to local concerns, it is

Half Hawley Interchange



I94_219_3

⁴ <http://www.fhwa.dot.gov/design/interstate/pubs/access/access.pdf>, page 43.

imperative that primary consideration is placed on the function of the overall interstate freeway and the importance in serving broader regional and Interstate traffic needs. Interstate drivers expect that interchanges provide for all movements and that if they exit at an interchange that they will be able to return to the interstate in the same direction from the same interchange. FHWA has provided engineering and operational acceptability for the half interchange at Hawley Road because of the constraint posed by the cemeteries east of Hawley Road combined with extensive public and local government input indicating that removing the entire Hawley Road interchange would have a socioeconomic impact on businesses and residents that currently use the Hawley Road interchange.

Zablocki Drive would remain at its present location, and its bridge over I-94 would be replaced and raised, requiring reconstruction of short segments of Zablocki Drive on each side of the new bridge (about 340 feet north of I-94 and 210 feet south of I-94).

The freeway entrance and exit ramps at the Mitchell Boulevard interchange would be removed. Having entrance and exit ramps in the narrow cemetery area would increase congestion and would either impact the cemeteries or, to avoid the impacts, would create very short and unsafe merge distances on the interstate. The Mitchell Boulevard interchange would be replaced by a new local road interchange under the Stadium Interchange. A one-way westbound frontage road on the north side of I-94 would connect the new local road interchange to Mitchell Boulevard near the existing westbound I-94 exit ramp at Mitchell Boulevard. See Section 2.2.2.2 for more information on the new local road interchange and frontage road.

As part of the At-grade alternative with a half interchange at Hawley Road (preferred alternative) in the west segment, WisDOT would construct some off-interstate improvements to mitigate the traffic impacts of partially closing the Hawley Road interchange. The improvements include extending Washington Street to make it easier for drivers in the Hawley Road corridor to access the 68th Street/70th Street interchange with I-94 and improvements at three local road intersections to improve local road operations under the partial closure of the Hawley Road interchange. See Section 2.3 for additional information about the off-interstate improvements.

For the At-grade alternative, there would be one business displacement and four residential displacements under the no Hawley Road interchange option and two business and five residential displacements under the half interchange at Hawley Road option. The At-grade alternative would cost about \$115 million (2014 dollars) to construct with no Hawley Road interchange and about \$125 million (2014 dollars) with the half interchange at Hawley Road.⁵

The United States Department of Veterans' Affairs (VA) expressed particular concern about the possibility of the Hawley Road interchange closing (see letter from VA Medical Center in Appendix D, page D-28). The VA noted that many of its 6,000 employees, as well as some of the 1 million patients per year, use the Hawley Road interchange to access its campus. All of the ambulance providers that access the VA Medical Center by freeway use the Hawley Road interchange. The VA has stated that closing the Mitchell Boulevard interchange would not be as big of an issue as closing the Hawley Road interchange. Only about 20 percent of freeway trips to the VA campus use the Mitchell Boulevard interchange. The half interchange at Hawley Road, with ramps to and from the west, would address the VA's concern regarding access.

In its comments, the City of Milwaukee preferred the At-grade alternative over the Double Deck alternative, but also voiced concern about loss of access at Hawley Road (Appendix D, D-56, D-62, and D-63). The City of West Allis was also concerned about the potential loss of access at Hawley Road, and opposed any alternatives that would divert traffic onto city streets (Appendix D, D-76).

⁵ The Washington Street extension and the improvements to the three local road intersections would cost an additional \$23 million (2014 dollars).

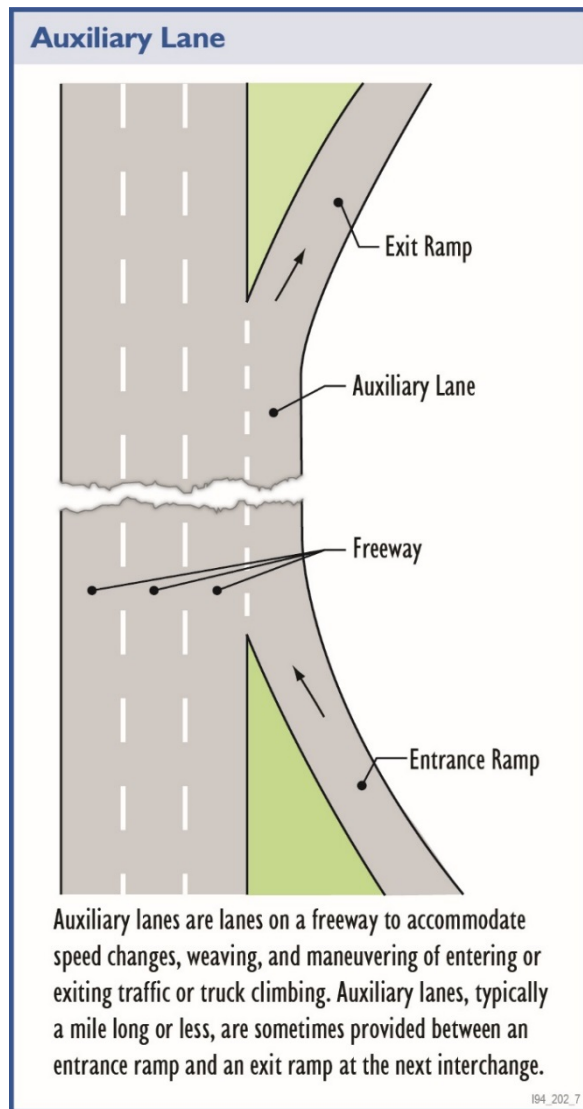
Public input was split on the At-grade and Double Deck alternatives. In general, those who live near the freeway and commented on the project supported the At-grade alternative. Residents and businesses that use the Hawley Road interchange have expressed concern about the additional time and indirection that would be caused by removing the Hawley Road interchange. The next closest interchange would be the 68th Street/70th Street interchange, about 8 blocks west of Hawley Road.

The Section 106 consulting parties generally preferred the At-grade alternative because, pending further engineering design, it would result in a No Adverse Effect on Calvary Cemetery, Northwestern Branch, National Home for Disabled Volunteer Soldiers National Historic Landmark (Soldiers' Home NHL), Soldiers' Home Historic District, Soldiers' Home Reef NHL, and Story Hill Residential Historic District 2 and 3. See Section 3.24, Historic Properties, and the final Section 4(f) evaluation (Section 4) for more information.

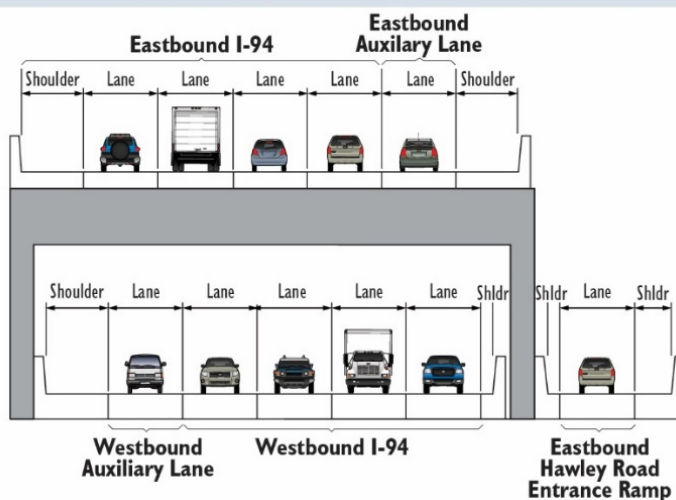
Double Deck (All Up or Partially Down)

The Double Deck alternative would reconstruct I-94 to 8 travel lanes (4 in each direction). A double deck (the freeway lanes would be stacked with one set of freeway lanes elevated over the other) would be constructed in the area between the cemeteries to avoid direct impacts to the cemeteries. The transition back to side-by-side freeway lanes would occur at about 64th Street, just west of the Hawley Road interchange on the west and Yount Drive, just west of the Stadium Interchange on the east (**Exhibit 2-4**). The Double Deck alternative would be compatible with either alternative in the east segment.

All I-94 lanes would be 12 feet wide under this alternative. Eastbound traffic is located on the upper level, while westbound traffic is located on the lower level (**Exhibit 2-5**). The upper level (eastbound traffic) consists of four 12-foot freeway lanes and one 12-foot auxiliary lane. The eastbound auxiliary lane would serve vehicles entering and exiting I-94 between the 68th Street/70th Street interchange and the Stadium Interchange. The lower level (westbound

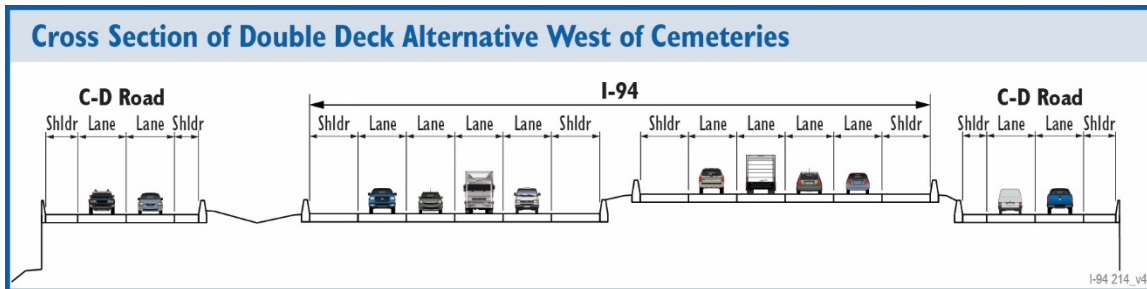


Cross Section of Double Deck Alternative Between Cemeteries



traffic) consists of four 12-foot freeway lanes and one 12-foot auxiliary lane. The westbound auxiliary lane would serve vehicles entering and exiting I-94 between the Stadium Interchange and the Hawley Road and 68th Street/70th Street interchanges. The eastbound Hawley Road entrance ramp would be located at ground level, running counter-directional to the westbound traffic.

The shoulder widths will vary in this segment as the available right-of-way varies near the cemeteries where the inside and outside shoulder width would be 12 feet for the eastbound traffic on the upper deck and 10 feet for the westbound traffic on the lower deck. The 10-foot shoulders balance the safety needs of the project with the consideration of impacts to the cemeteries. East and west of the cemeteries, the freeway would have standard 12-foot lanes and 12-foot shoulders.

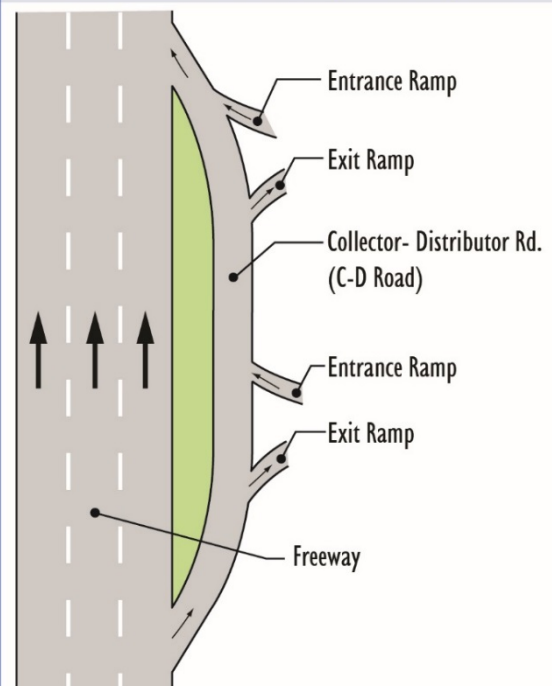


This alternative would reconstruct the 68th Street/70th Street and Hawley Road interchanges with C-D roads connecting the interchanges (see text box for information on C-D roads). C-D roads would eliminate weaving on I-94 between 68th Street and Hawley Road, improving safety and traffic operations on I-94, while still providing direct access to and from I-94. The 68th Street/70th Street and Hawley Road interchanges would be reconstructed with a configuration similar to that of the existing interchanges.

Ramps in both directions would remain at the Hawley Road interchange with the Double Deck alternative. Ramps at the Mitchell Boulevard interchange would be removed and replaced by a new local road interchange within the Stadium Interchange. Zablocki Drive would be shifted east, where it would be parallel to Mitchell Boulevard, but would not be connected to it. Zablocki Drive would continue to provide a connection between the Zablocki Medical Center and Bluemound Road (and between the north and south sides of Wood National Cemetery). Zablocki Drive and Mitchell Boulevard would pass under I-94 (Zablocki Drive crosses over I-94 today).

The Double Deck alternative has two design options: “all up” and “partially down.” Under the all up option, the top level of the freeway (eastbound roadway) would be about 30 feet above the existing freeway elevation. The bottom level (westbound roadway) would be at about the same elevation as the existing freeway. Under the partially down option, the top level of the freeway (eastbound roadway) would be 22 to 24 feet above the existing freeway. The bottom level (westbound roadway) would be about 6 to 8 feet below the existing freeway. For both options, the construction footprint would generally be the same.

Collector-Distributor Road (C-D Road)



A collector-distributor road, or C-D road, is a limited access road that carries traffic from local roads and arterial roads to freeways or highways. The purpose of a C-D road is to eliminate weaving on the freeway and reduce the number of exit and entrance points on the freeway.

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There would be 2 business displacements and 10 residential displacements under the Double Deck alternative. The all up option would cost \$295 million (2014 dollars) to construct, while the partially down option would cost \$320 to \$345 million (2014 dollars) to construct.

The VA's concern about removal of the Hawley Road interchange is addressed by the Double Deck alternative, since the interchange would remain as a full interchange. The half interchange option of the At-grade alternative would provide access to and from Hawley Road to and from the west, but would not provide the full access at Hawley Road provided under the Double Deck alternative. The VA Medical Center stated that a half interchange would address its access concerns at Hawley Road.

The City of Milwaukee opposes the Double Deck alternative, but is also concerned about loss of access at Hawley Road under the At-grade alternative. Visual and noise impacts to adjacent neighborhoods are key concerns to the City of Milwaukee. Public input is split on the At-grade and Double Deck alternatives. In general, those who do not live near the freeway support the Double Deck alternative because it would reduce traffic congestion and increase safety.

The Section 106 consulting parties generally oppose the Double Deck alternative because it would have an Adverse Effect on Calvary Cemetery, Soldiers' Home NHL, Soldiers' Home Historic District, and Story Hill Residential Historic District 2 and 3. See Section 3.24, Historic Properties, and the final Section 4(f) evaluation (Section 4) for more information.

2.2.2.2 East Segment

The east segment of the study area is from Yount Drive, just west of the Stadium Interchange, to 16th Street (**Exhibit 2-1**). This segment includes the existing 35th Street and 25th/26th/28th Street service interchanges and the Stadium Interchange. The alternatives retained for detailed evaluation include a new local road interchange (44th/46th Streets) under the Stadium Interchange to replace the interchange removed from Mitchell Boulevard.

On-alignment Alternative (*Preferred Alternative*)

Under the On-alignment alternative, the Stadium Interchange would be reconstructed as a hybrid between a service interchange and a system interchange (**Exhibit 2-6**). The highest point of the new Stadium Interchange would be about 25 feet higher than the existing interchange. Some of the ramps would be free-flow and some would be controlled by a traffic signal. All of the exit ramps from I-94 to US 41/Miller Park Way would be free-flow ramps (no signals).

WisDOT decided to change the Stadium Interchange from a system interchange⁶ (see Section 1.1 for interchange definitions) for two reasons:

- First, US 41/Miller Park Way does not carry as much traffic as a typical 6-lane freeway. US 41/Miller Park Way was constructed as a freeway because it was intended to connect to a larger freeway network that was never completed.⁷ As a result, the amount of traffic entering and exiting US 41/Miller Park Way at

⁶ The current Stadium Interchange was designed and built to function as a system interchange in anticipation of planned freeway development. However, since the current US 41 (now WIS 175) was never fully developed as a freeway, and the route does not function as a freeway for an appreciable distance north and south of the interchange, the interchange is not technically classified as a system interchange by FHWA. Throughout this document, the existing Stadium Interchange is generally referred to as a system interchange. FHWA's classification of the type of interchange, as it pertains to the existing interchange, has no bearing on the proposed design of the updated interchange. The proposed Stadium Interchange design, as part of the preferred alternative, is referred to as a "hybrid" interchange. This term can also be synonymous with a high-level service interchange. Because previous project documentation, including the Draft EIS, referred to the current Stadium Interchange as a system interchange, and the proposed design as a "hybrid" interchange and since the terminology has no bearing on the proposed design as part of the preferred alternative, the terminology has been retained in the Final EIS.

⁷ US 41 in the study area has been re-designated as a state highway (WIS 175) due to the conversion of US 41 to I-41 and the rerouting of I-41/US 41 along I-894 and US 45. The US 41 Interstate Conversion Project converted US 41 to an interstate highway from the Mitchell Interchange in Milwaukee to Green Bay via I-894, US 45, and US 41. This involves no improvements of the former US 41 route in the I-94 East-West Corridor (other than additional signing) and does not change the forecasted traffic volume on the roadways. Project signing was completed in 2015. For more information on the US 41 Interstate Conversion Project, see the project's website at: <http://www.dot.wisconsin.gov/projects/nregion/41/>.

the Stadium Interchange does not require entirely free-flow movements like those that a system interchange provides.

- Second, the cost of reconstructing this interchange as a full system interchange is higher than it would be if reconstructed as a service interchange (the footprint of a system interchange would increase to accommodate modern design standards, increasing impacts to adjacent neighborhoods and parking adjacent to Miller Park).

Because there is a greater amount of traffic on US 41/Miller Park Way than on most urban streets (like 68th and 70th Streets or Hawley Road, for example), but still less than on other urban freeways like I-94 or I-894, WisDOT decided on a “hybrid” interchange with both free-flow and signal-controlled ramps, but a lower speed design (hybrid ramps design speed of 35 mph). The ramps from southbound US 41 to eastbound I-94 and from northbound Miller Park Way to westbound I-94 would be controlled by a traffic signal. The reconstructed interchange would have a smaller footprint than the existing interchange.

I-94 through the Stadium Interchange would operate at level of service D or better. US 41/Miller Park Way would generally operate at level of service C or better in the design year (2040) during the morning and afternoon peak hours. Perhaps the biggest change in the way the interchange would operate is that there would be a traffic signal on US 41/Miller Park Way that would control through-traffic on US 41/Miller Park Way and control left turns onto I-94 from US 41/Miller Park Way.

Underneath the Stadium Interchange, new entrance and exit ramps to 44th Street and a new local street (tentatively referred to as 46th Street) would be constructed (**Exhibit 2-7**). The ramps would replace the interchange that would be removed from Mitchell Boulevard. This interchange would connect to the existing Miller Park ring road and a new frontage road north of I-94. The new north frontage road would pass over Yount Drive and connect to Mitchell Boulevard near the existing westbound I-94 exit ramp at Mitchell Boulevard. For drivers on westbound I-94, these connections would provide similar access to existing Miller Park parking, the VA campus, and the Story Hill neighborhood. The frontage road was not part of the reconstructed Stadium Interchange described in the Draft EIS. The frontage road came about through continued coordination with the Milwaukee Brewers. The Brewers believe that the frontage road would improve traffic operations for loading and unloading their parking lots. Along with helping the Brewers, the northern frontage road would also improve access for the VA campus and local residents, so it was added to the alternative.

As part of the reconstructed Stadium Interchange, there would be no access from northbound Miller Park Way to the Wisconsin Avenue interchange on US 41. Those exiting I-94 to US 41 would continue to be able to exit at Wisconsin Avenue. Additionally, those entering US 41 southbound from Wisconsin Avenue would continue to be able to access I-94 in both directions and travel south along US 41/Miller Park Way. As part of the reconstructed Stadium Interchange, there would be no direct access from US 41 or



Proposed reconfiguration of the Stadium Interchange (looking at the Stadium Interchange from the northeast).

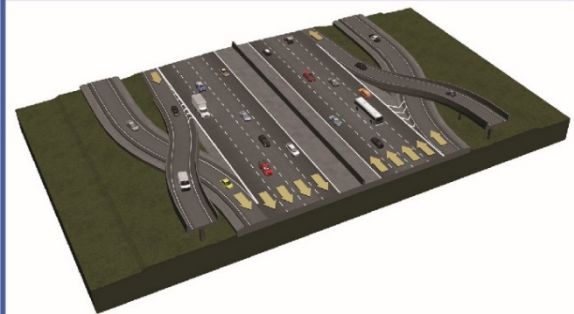
Miller Park Way to the 35th Street interchange via I-94. Traffic on US 41/Miller Park Way would access 35th Street from Wisconsin Avenue north of I-94 or National Avenue south of I-94. Access to the 35th Street interchange would continue to be provided for motorists on I-94.

East of the Stadium Interchange, the 35th Street interchange would be reconstructed. Braided ramps between the Stadium Interchange and the 35th Street interchange would allow the two closely spaced

interchanges to operate safely (see text box for more information on braided ramps). Braided ramps would also be provided between the 35th and 27th Street interchanges. East of the 35th Street interchange, I-94 would remain close to its current alignment and be widened to the south. The centerline of reconstructed I-94 would be about 50 feet south of the existing freeway centerline. The entrance and exit ramps near 27th Street (which is also State Highway 57 [WIS 57]) would remain where they are today at 25th, 26th, and 28th Streets and St. Paul Avenue because there would not be enough room to consolidate them at 27th Street.

The On-alignment alternative would improve sight distance compared to the existing freeway by widening the shoulders beyond the standard 12 feet (where possible), but not to the extent of the Off-alignment alternative, which would straighten the freeway. The sight distance would meet AASHTO minimum criterion. The On-alignment alternative would reduce crashes on I-94 by 28 percent as compared to the Replace-in Kind alternative.⁸ This is due to improved design and improved traffic operations on I-94.

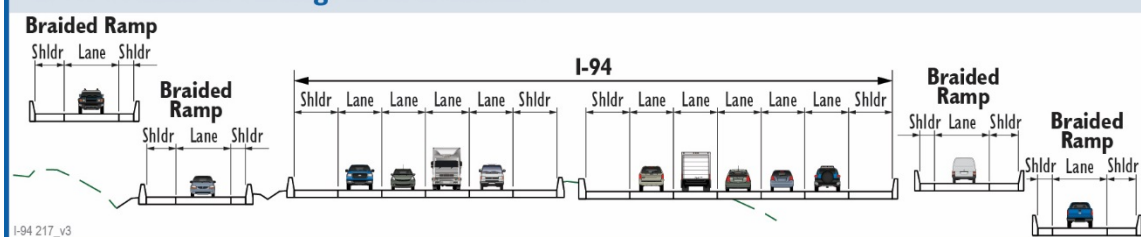
Braided Ramps



Weaving refers to freeway traffic entering and leaving the freeway in close proximity and resulting in vehicle paths crossing each other. Ramp braids are freeway on and off ramps that are close to one another and are built so one ramp crosses over the other. Ramp braids eliminate the weaving that would otherwise occur.

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Cross Section of On-Alignment Alternative



The intersection of 27th Street and St. Paul Avenue would need more extensive reconstruction under this alternative than the Off-alignment alternative because most of the exiting freeway traffic destined for 27th Street would first get to St. Paul Avenue at 25th or 26th Street, and then turn onto 27th Street at its intersection with St. Paul Avenue. Similarly, most of the traffic entering the freeway at 25th and 28th Streets would also use the 27th Street/St. Paul Avenue intersection. This would require improvements such as left- and right-turn lanes at the 27th Street/St. Paul Avenue intersection. This would result in four commercial displacements at or near the 27th Street/St. Paul Avenue intersection under the On-alignment alternative, compared to one displacement in this area under the Off-alignment alternative. However, the On-alignment alternative would reduce business displacements south of the freeway to three businesses, compared with four businesses under the Off-alignment alternative.

⁸ This is according to the Interchange Safety Analysis Tool-enhanced (ISATe). The ISATe is an FHWA-approved spreadsheet-based tool that analyzes crash frequency and crash severity along freeways and interchanges. It estimates the frequency of crashes based on actual crash frequencies on over 50 freeway segments around the country. ISATe estimates the number of crashes based on traffic volume, horizontal alignment (that is, curves), lane and shoulder width, length of deceleration and acceleration lanes, and weaving lengths. ISATe is not capable of estimating crashes based on vertical alignment (that is, steepness of grades, or hills). For more information on ISATe see Sections 2.2.3.2 and 3.3.2.4.

In all, eight commercial properties in the east segment would be acquired as part of the On-alignment alternative, including some properties located south of I-94. Two additional vacant commercial buildings/parcel would also be acquired. Additionally, three residences along 35th Street would be displaced. The On-alignment alternative would acquire 2 fewer acres of land than the Off-alignment alternative.

This alternative would cost about \$710 to \$735 million (2014 dollars),⁹ or about \$50 to \$100 million less than the Off-alignment alternative.

This alternative was part of the initial range of alternatives considered and dropped from consideration. In response to City of Milwaukee concerns about right-of-way acquisition and business displacement impacts of the Off-alignment alternative, the On-alignment alternative was then re-analyzed and added back into the range of alternatives retained for detailed study.

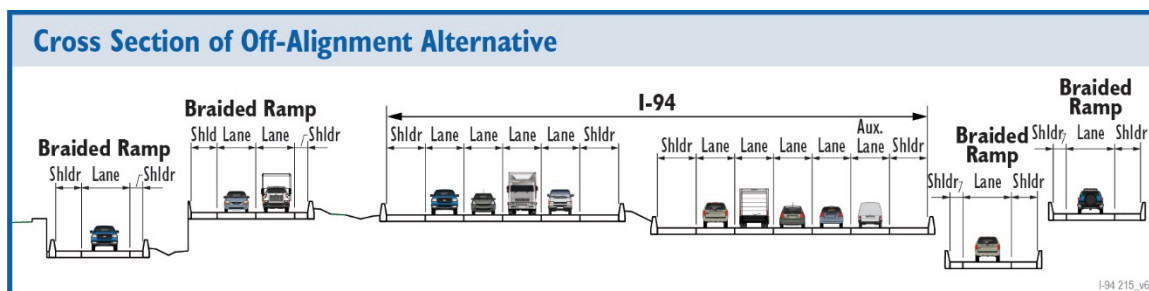
Off-alignment

The Off-alignment alternative (**Exhibit 2-8**) would feature the same Stadium Interchange redesign as the On-alignment alternative described in the preceding section. Like the On-alignment alternative, the Stadium Interchange would be reconstructed as a hybrid between a service interchange and a system interchange. The highest point of the new Stadium Interchange would be about 25 feet higher than the existing interchange. Some of the ramps would be free-flow and some would be controlled by a traffic signal. All of the exit ramps from I-94 to US 41/Miller Park Way would be free-flow ramps (no signals). The reconstructed interchange would have a smaller footprint than the existing interchange. Like the On-alignment alternative, there would be no access from northbound Miller Park Way to the Wisconsin Avenue interchange on US 41 and no access to the 35th Street interchange from US 41/Miller Park Way.

Like the On-alignment alternative, I-94 through the Stadium Interchange would operate at level of service D or better. US 41/Miller Park Way would generally operate at level of service C or better in the design year (2040). There would be a traffic signal on US 41/Miller Park Way that would control through traffic on US 41/Miller Park Way and control left turns onto I 94 from US 41/Miller Park Way.

Underneath the Stadium Interchange, new entrance and exit ramps to 44th Street and a new local street (tentatively referred to as 46th Street) would be constructed. The ramps would replace the interchange that would be removed from Mitchell Boulevard. This interchange would connect to the existing Miller Park ring road, and a new frontage road would be provided north of I-94, traveling over Yount Drive and connecting to Mitchell Boulevard near the location of the existing westbound I-94 exit ramp at Mitchell Boulevard. Also, as with the On-alignment alternative, there would be no access from Miller Park Way northbound to the Wisconsin Avenue interchange on US 41.

Similar to the On-alignment alternative, the 35th Street interchange would be reconstructed with braided ramps between 35th Street and Stadium interchanges. Braided ramps would also be provided between the 35th and 27th Street interchanges. The 27th Street interchange would be reconstructed so that all ramps directly connect to 27th Street. Currently, the ramps at this interchange connect to 25th, 26th, 28th Streets and St. Paul Avenue, all local roads.



⁹ Construction in the Stadium Interchange area of the east segment is about \$25 million greater if the Double Deck alternative is identified for the west segment. This is due to slightly different ramp configurations in the Stadium Interchange.

The difference between the two alternatives is that east of 32nd Street, I-94 would be reconstructed about 400 feet south of its current alignment. I-94 would rejoin its existing alignment near 18th Street. Benefits of re-aligning to the south include the following:

- Remove the horizontal and vertical curves (i.e., downhill with a curve at the bottom) on I-94 near 25th Street that limit sight distance for eastbound I-94 drivers as they approach the Marquette Interchange. This would decrease the crash frequency on this segment of I-94 by 29 percent compared to the Replace-in-Kind alternative, and 1 percent compared to the On-alignment alternative.
- Allow enough space to build entrance and exit ramps directly to 27th Street. This would provide a more direct connection between I-94 and 27th Street, a major north-south arterial and state highway.

Realigning the freeway would have both beneficial and adverse impacts. The adverse impacts are that it would acquire 2 more acres of land than the On-alignment alternative. Additionally, the Off-alignment alternative would require six commercial displacements (two additional vacant commercial buildings/parcels would be acquired). The commercial displacements are located in the northwest quadrant of the 35th Street interchange and south of I-94 along Greves Street and St. Paul Avenue between 27th and 23rd Streets. A beneficial impact, aside from the transportation benefits previously discussed, is that traffic entering and exiting the freeway would be removed from residential areas on 25th, 26th, and 28th Streets. The displacement impacts could be minimized if the current freeway right-of-way could be redeveloped. In particular, the area currently occupied by the 28th Street westbound entrance ramp could be redeveloped as housing, since it is in a residential area. There would be no residential displacements under this alternative.

Menomonee Valley Partners (MVP) has expressed concern over the business displacement impacts on St. Paul Avenue and the long bridge that would carry I-94 over St. Paul Avenue. MVP and the City of Milwaukee are currently updating the land use plan for the Menomonee Valley, with a focus on redeveloping St. Paul Avenue. MVP and the Potawatomi Casino and Hotel (located on Canal Street in the Menomonee Valley) have expressed concern about consolidating access at 27th Street because it would change access to the Menomonee Valley. Currently, casino visitors arriving on I-94 from the west can exit at 26th Street and make two right turns to reach the Menomonee Valley via 25th Street. Under the Off-alignment alternative, casino visitors, as well as other visitors to the Menomonee Valley, would need to make a left turn onto 27th Street and then two right turns to reach the Valley by 25th Street. However, consolidating the interchange ramps to 27th Street was received positively by the public overall.

The City of Milwaukee is concerned about the right-of-way acquisition and the business displacement impacts of this alternative. There would be six business displacements (three additional vacant commercial buildings/parcels would be acquired) and three residential displacements under the Off-alignment alternative. This alternative would cost about \$785 million to \$810 million (2014 dollars),¹⁰ or about \$50 to \$100 million more than the On-alignment alternative.

2.2.3 Evaluation of Alternatives Retained for Detailed Evaluation in Relation to Purpose and Need

The initial range of alternatives was assessed based on each alternative's ability to meet the project's purpose and need (see Section 1.2 and 1.3). Each was assessed based on its ability to satisfy the following factors:

- Address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes
- Accommodate existing and future traffic volumes at an acceptable level of service
- Maintain a key link in the local, state, and national transportation network
- Replace deteriorated pavement

Alternatives that did not have the potential to substantially meet the overall purpose and need of the project were eliminated from detailed study. As such, WisDOT and FHWA determined that 8 lanes are needed in order to meet the project's purpose and need (see Section 2.5.5.1). Through a series of

¹⁰ Construction in the Stadium Interchange area of the east segment would have been about \$25 million (2014 dollars) greater if the Double Deck alternative was identified for the west segment. This is due to slightly different ramp configurations in the Stadium Interchange.

alternatives screening iterations (found in Section 2.5, Appendix A, and on the CD at the back of the document), the project team arrived at two, 8-lane Modernization Alternatives for the west segment and two, 8-lane Modernization Alternatives for the east segment of the project, as discussed in Section 2.2.2.

The alternatives retained for detailed study were evaluated in greater detail regarding how they met project purpose and need. The project team developed specific questions for each purpose and need element to determine if/how the alternatives met purpose and need. Since all the alternatives would replace deteriorated pavement, meeting that project goal was not included as part of this analysis. The factor of addressing obsolete design to decrease crashes was broken into two factors: design deficiencies and safety.

Section 2.2.3.1 provides an overview of the purpose and need factors analyzed and the questions asked to determine if each alternative meets that element of the purpose and need. In Section 2.2.3.2, the questions are answered for each remaining alternative and summarized in **Table 2-2**.

2.2.3.1 Purpose and Need Factors

Address Freeway Design Deficiencies

Improving the design deficiencies on existing I-94 would improve safety, decrease crashes, and improve traffic operations. New and reconstructed freeways must meet the minimum values for 13 controlling design criteria, such as alignments, lane and shoulder widths, and sight distance, or receive an exception from WisDOT and FHWA. Design criteria developed for the controlling elements are specified in WisDOT's *Facilities Development Manual* and based on AASHTO's *A Policy on Geometric Design of Highways and Streets*, 6th Edition (2011a) and AASHTO's *A Policy on Design Standards – Interstate System* (2005). The documents are the basis for evaluating the study area freeway system for acceptability, function, and safety. Design guidelines in WisDOT's *Facilities Development Manual* govern design of the alternatives. The *Facilities Development Manual* guidelines generally meet or exceed AASHTO criteria. However, where the *Facilities Development Manual* does not address AASHTO criteria, the AASHTO criteria govern.

The existing deficient freeway conditions along I-94 include the following: horizontal curves, vertical alignment, stopping sight distance, decision sight distance, cross section, vertical clearance, ramp spacing, left-hand entrances and exits, ramp taper rates, and acceleration and deceleration lanes. All alternatives retained for detailed study in the Draft EIS would substantially improve these deficiencies along I-94 as compared to the existing conditions.

WisDOT and FHWA's position is that alternatives will meet design criteria, unless meeting the criteria would incur a high level of impact that cannot be reasonably mitigated, or results in compromising another purpose and need factor. If a portion of the alternative does not meet existing design criteria, a design exception will be required.¹¹ The project's draft *Exceptions to Standards Memorandum* provides detailed explanations of where design exceptions would be required. The memorandum will be finalized as part of the formal *Exceptions to Standards Report* during the final design phase.

The question used to determine how the alternatives address the design deficiencies of the existing corridor is:

- Does the alternative upgrade I-94 to current design criteria, where appropriate¹², allowing for a minimal number of design exceptions due to environmental constraints?

¹¹ At this early stage of the project development process, FHWA and WisDOT cannot guarantee that the design exceptions will be approved. FHWA has a process in place to handle requests for exceptions to freeway design standards and it includes WisDOT preparing an Exceptions to Standards Report, which is reviewed by FHWA's Wisconsin Division. The design exceptions that would be required under the At-grade alternative are substantial and unprecedented for an interstate reconstruction project in Wisconsin (the 2013 resurfacing of I-94 from 16th to 35th Streets resulted in 11-foot lanes and narrow shoulders, but that project was approved because it would be in place only a few years until I-94 is reconstructed as part of this project). FHWA has provided preliminary acceptance of some of the design exceptions through the cemetery area due to the significant environmental constraints.

¹² The key is defining "where appropriate." In other words, which design criteria could be compromised and which should not be compromised? WisDOT and FHWA will consider compromising design criteria when tools like ISATe and Paramics demonstrate that, even though a design criterion is not met, safety and traffic operations are comparable to an alternative that does meet the design criteria. These are the design criteria that are easier to compromise. The design criteria that are harder to compromise are those where a demonstrable safety or traffic operations deficiency would result. And, of those two, safety is the harder of the two to compromise.

Safety

WisDOT measures highway safety by the frequency and severity of crashes and maintains a database of crashes that occur on the state highway system. WisDOT uses the information to develop statewide average crash rates for highways. WisDOT and FHWA used Wisconsin statewide averages for large urban freeways as the basis to evaluate the I-94 East-West Corridor. See the text box titled “WisDOT Crash Rate Calculation” in Section 1.3.3 for more information regarding the comparison of crash frequency.

Crash rates in the I-94 East-West Corridor are mostly at least 2 to 3 times higher than the statewide average for a similar roadway, and several sections are more than 4 times higher than the statewide average. On the study area freeway system, the most common types of crashes were rear-end, single-vehicle run-off-road, and sideswipe. All alternatives retained for detailed evaluation would reduce crashes on I-94 compared to the existing condition.

The question to measure how the alternative improves safety in the project corridor is:

- *Does the alternative address safety on I-94?*

Existing and Future Traffic Volumes and Resulting Operations

A key purpose and need element of the project is to accommodate existing and future traffic volumes at an acceptable level of service. Level of service is the measure of a roadway’s congestion using rankings from A to F. Freeway level of service is based on the number of vehicles per hour per lane with level of service A exhibiting free-flow traffic and level of service F exhibiting severe congestion that approaches gridlock. FHWA guidance generally calls for level of service C for new construction and reconstruction projects on the Interstate Highways in order to meet FHWA requirements to adequately serve the existing and planned future traffic (23 CFR 625.2(a)(1)).



Level of service D may be considered acceptable in urban areas like Milwaukee County, where potential impacts resulting from achieving level of service C would be extensive and costly. FHWA agreed that level of service D is appropriate for this project. The level of service guidance for this project was documented in the *Design Hourly Volume (DHV) and Level of Service for the I-94 East-West Stadium Interchange Study* technical memorandum from September 2012 (located on the CD at the back of the document).

Existing traffic volumes along I-94 result in congestion during peak hours. In the study area, I-94 currently carries between 143,000 (east of 25th Street) and 160,500 (east of Stadium Interchange) vehicles per day on an average weekday. Currently, during the heaviest traffic periods (peak hours), the level of service on I-94 ranges between level of service C and level of service F.

Based on SEWRPC traffic forecasts, traffic along I-94 in the study area is expected to carry between 160,000 and 186,000 vehicles per day by the year 2040¹³. By 2040 (the project’s design year) I-94 would generally operate at level of service D to F during the morning peak hour while generally operating at level of service E or F in the afternoon peak hour if no improvements are made. Many of the locations that currently have level of service E will degrade to level of service F by 2040. In addition, many more locations on I-94 will operate at a lower level of service in 2040.

¹³ The SEWRPC 2040 travel forecasts take into account recent and planned development in or near the study area. The estimated 2040 travel forecasts are based on the estimated 2035 forecast. SEWRPC projected its forecast to 2040 based on the same annual growth rate used for the 2030 to 2035 timeframe (0.4 percent annually). See the technical memorandum titled *Travel Forecasting Methodology for I-94 East-West Corridor*, located on the CD at the back of the document, for more information on how WisDOT used SEWRPC’s 2040 traffic forecast to assess future traffic conditions for this study.

Travel time predictability, or reliability, is a function of level of service that is important to travelers along I-94. Travel time reliability can be disrupted by crashes that block traffic or other traffic flow disruptions. Providing reliable and predictable travel on I-94 aids in the flow of goods and people through the corridor and helps in promoting local, regional, and statewide development. Tools are being developed that would help quantify travel time reliability, but they have not been thoroughly vetted by FHWA for use as a standard on a corridor study like this one.

The question to measure if the alternatives addressed traffic operations issues in the corridor is:

- *Does the alternative improve I-94 operational efficiency to level of service D (overall) and provide more predictable travel time?*

System Linkage and Route Importance

I-94 is a major east-west freeway link across the northern United States and is part of the National System of Interstate and Defense Highways, a federal and state “long truck route,” and a backbone route in WisDOT’s *Connections 2030 Long-Range Multimodal Transportation Plan* (WisDOT 2009). As part of the National System of Interstate and Defense Highways, a roadway must provide a high level of safety, design, and operational standards. According to AASHTO’s *A Policy on Design Standards Interstate System* (2005), “The National System of Interstate and Defense Highways is the most important in the United States. It carries more traffic per kilometer (mile) than any other comparable national system and includes the roads of greatest significance to the economic welfare and defense of the nation. The highways of this system must be designed in keeping with their importance as the backbone of the nation’s highway systems. To this end, they must be designed to ensure safety, permanence, utility and flexibility to provide for predicted traffic growth.”



As a “long truck route,” longer commercial vehicles are able to use I-94. Backbone routes in WisDOT’s *Connections 2030* plan are highways that provide connections between major statewide regions and economic centers and tie them to the national transportation network.

I-94 is also a critical link in Milwaukee County’s freeway system. In addition to serving long-distance travelers and regional and national freight movement, I-94 is an important commuter route for many of the approximately 624,000 employees who work in Milwaukee County. The I-94 East-West Corridor is adjacent to, or provides access to, many local destinations, including Downtown Milwaukee, Potawatomi Hotel and Casino, Menomonee Valley Industrial Park, Miller Park, the VA Campus, and MillerCoors Brewing Company.

The question to measure if the alternatives maintained system linkage and route importance is:

- *Does the alternative provide system continuity and maintain function as an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 “backbone” route, and a federal and state “long truck route”?*

2.2.3.2 Evaluating Alternatives Retained for Detailed Evaluation against Purpose and Need

This section answers the questions posed in the previous section for each alternative retained for detailed evaluation. The answers to each question note how well the alternative meets purpose and need and provide a discussion as to how the alternative meets purpose and need.

West Segment

Does the alternative upgrade I-94 to current design criteria, where appropriate, allowing for a minimal number of design exceptions due to environmental constraints?

The At-grade alternative (both the no Hawley Road interchange option and the half Hawley Road interchange option) would partially, but sufficiently, meet the design deficiencies aspect of the project purpose and need.

The At-grade alternative would upgrade I-94 to current design criteria in most locations. FHWA and WisDOT have adopted AASHTO's *A Policy on Design Standards—Interstate Systems* (2005) standard freeway lane widths of 12 feet and consideration of 12-foot paved shoulders where truck traffic exceeds 250 DHV in the design year.

However, the criteria cannot be met for the section of I-94 between the cemeteries, where, at its narrowest point, the freeway footprint narrows to roughly 110 feet. Allowing a 6-foot width for roadway curvature and constructability leaves 104 feet for the at-grade typical cross section in this area.

The At-grade alternative cross section for both Hawley Road interchange options would consist of eight, 11-foot lanes and 2-foot inside and outside shoulders for a short distance through the cemetery area, transitioning to 12-foot lanes and 12-foot shoulders outside of the cemetery area. Eastbound and westbound traffic would travel in 11-foot lanes for roughly 30 feet. These distances of 11-foot lanes were reduced from those noted in the Draft EIS due to refined design; specifically, maximizing the lane width transitions to keep the lanes as wide as possible, given available space. This reduction of the length of 11-foot lanes makes the presence of the 11-foot lanes more acceptable. The lanes would transition from 12 feet to 11 feet for several hundred feet east and west of the 11-foot lane segment. For eastbound traffic, the adjacent transitions from 12- to 11-foot lanes would be roughly 780 feet to the west and 800 feet to the east of the short section of 11-foot lanes. For westbound traffic, the transition from 12- to 11-foot lanes would be roughly 580 feet to the west of the short section of 11-foot lanes and 890 feet to the east.

The shoulder widths would vary in this segment because the available right-of-way varies (the shoulders would be as narrow as 2 feet). For eastbound traffic, the outside shoulder would transition from 12 feet to 8 feet for 85 feet and then would consist of a shoulder width of between 2 and 8 feet for the next 1,230 feet. The outside shoulder width would transition from 8 feet to 12 feet over the next 75 feet. The eastbound inside shoulder would transition from 12 to 8 feet for 230 feet and then would consist of a shoulder width between 2 and 8 feet for the next 950 feet. The inside shoulder width would transition from 8 feet to 12 feet over the next 280 feet.

For westbound traffic, the outside shoulder would transition from 12 feet to 8 feet for 55 feet and then would consist of a shoulder width of between 2 and 8 feet for the next 960 feet. The westbound inside shoulder would transition from 12 to 8 feet for 270 feet and then would consist of a shoulder width between 2 and 8 feet for the next 990 feet. The inside shoulder width would transition from 8 feet to 12 feet over the next 220 feet.

To summarize, for eastbound traffic, there would be less than 12-foot lanes for about 1,610 feet, less than 12-foot inside shoulder for 1,460 feet, and less than 12-foot outside shoulder for 1,390 feet. For westbound traffic, there would be less than 12-foot lanes for about 1,500 feet, less than 12-foot inside shoulders for 1,480 feet, and less than 12-foot outside shoulders for 1,010 feet. This condition would require design exceptions. **Exhibit 2-3** provides a visual summary of the distances described in this section.

To help mitigate for the narrow lanes and shoulders, dynamic traffic management tools to warn drivers of closed lanes in the narrow segment, advance warning signs alerting drivers to the narrow lanes and narrow shoulders, and other tools like reflectors on the center median barrier wall and the outside barrier wall would likely be implemented to make the narrow lane/narrow shoulder segment as safe as possible.

The At-grade alternative would also require a design exception for inadequate sight distance in the cemetery area. The slight curve on I-94 through the cemeteries, combined with the 2-foot shoulders, would

cause the concrete median barrier to reduce sight distance. Lane and shoulder width and sight distance for the section of I-94 outside of the cemetery area in the west segment would meet design criteria.

As part of the At-grade alternative, the Mitchell Boulevard interchange would be removed and either half or all of the Hawley Road interchange ramps would be removed from I-94. A half interchange at Hawley Road (preferred alternative) is a design deficiency in itself, as FHWA guidelines call for either no interchanges or full interchanges at crossroads. See the At-grade alternative discussion in Section 2.2.2.1 for more information regarding FHWA's consideration of a half interchange at Hawley Road. Constructing the Washington Street extension and improvements to specific local road intersections would help mitigate for the reduction of access at the Hawley Road interchange.

If both the Mitchell Boulevard and Hawley Road interchanges were completely removed, there would be far less weaving traffic in this segment of the project. This would correct the existing deficient *ramp spacing* between Hawley Road and the 68th Street/70th Street interchange to the west and the Mitchell Boulevard interchange to the east. Additionally, eliminating the Mitchell Boulevard interchange would remove the *left-hand exit and entrance* ramps to and from Mitchell Boulevard on eastbound I-94 and the *left-hand entrance* ramps from Mitchell Boulevard to westbound I-94. Left-hand ramps do not meet current design criteria. Constructing a half interchange at Hawley Road, with ramps to and from the west, combined with removing the Mitchell Boulevard interchange, would address the deficient ramp spacing between the Stadium Interchange and Hawley Road interchanges, but would not address the deficient weaving distance between the Hawley Road and 68th Street/70th Street interchanges and would require a design exception. An auxiliary lane between the Hawley Road and 68th Street/70th Street interchanges would help traffic operations and safety.

The At-grade alternative would improve safety along I-94 for either Hawley Road interchange design. The improvement would largely be due to upgrading I-94 to current design criteria, the removal of the left-hand ramps at Mitchell Boulevard, and improved ramp spacing.

The Double Deck alternative (both the all up and partially down options) would upgrade I-94 to current design criteria in most locations and would meet the design deficiencies aspect of the project purpose and need. The Double Deck alternative would have 12-foot travel lanes; however, the shoulder on the westbound Double Deck portion would be 10 feet on the inside and on the outside. The shoulder widths do not meet WisDOT and AASHTO criteria and would require a design exception. Shoulder width outside of the cemetery area would meet design criteria.

Additionally, design exceptions would be required for *horizontal alignment, width of travel lane, shoulder width, and stopping sight distance* on some of the Hawley Road interchange ramps.

As part of the Double Deck alternative, the Mitchell Boulevard interchange would be removed from I-94. This would eliminate *ramp spacing* issues between the Mitchell Boulevard and Hawley Road and Stadium Interchanges. AASHTO criteria call for 1,000-foot spacing between entrances and exits on C-D roads to provide adequate weaving distance. The weaving distance would be 840 feet on the westbound C-D road and 685 feet on the eastbound C-D road. While the distances do not meet the design criteria, based on a Paramics-based traffic model (see text box) and the

WisDOT and FHWA assessed future traffic operations using two software tools. *Highway Capacity Software* (HCS) is a relatively simple software model that uses the estimated traffic volumes and basic freeway design inputs to estimate the level of service. *Paramics* is a more detailed simulation software program frequently used to estimate future traffic conditions. The key input is the amount of traffic on a given freeway segment. Paramics then estimates travel speeds and level of service based on the amount of traffic and the design of the freeway, such as the number of lanes, and location and spacing of entrance and exit ramps. WisDOT and FHWA used HCS and Paramics to validate the traffic operations of the alternatives discussed in Section 2.2. HCS is an appropriate tool to use, and Paramics was used to validate HCS results. HCS was the primary tool used to evaluate how alternatives would accommodate future traffic volumes. The Paramics software has not been used to screen alternatives. Rather, it is used to evaluate the more intricate details of how efficiently traffic will operate. This allows for minor adjustments within the alternatives in order to ensure that they will fully meet the level of service goals. Paramics is more heavily relied upon during design to optimize the preferred alternative.

Interchange Safety Analysis Tool-enhanced (ISATe) safety analysis, the distance between the ramps would still allow I-94 to operate at level of service C or D, while providing the same level of safety as an alternative with ramp spacing meeting the guideline. Additionally, eliminating the Mitchell Boulevard interchange would remove the *left-hand exit and entrance* to and from Mitchell Boulevard on eastbound I-94 and the *left-hand entrance* from Mitchell Boulevard to westbound I-94.

Does the alternative address safety on I-94?

All of the alternatives retained for detailed evaluation would reduce crashes on I-94 compared to existing conditions. The ISATe model, which correlates traffic volumes and roadway design features with crash frequency and crash severity, predicts that the improved roadway design and removal of interchange ramps will substantially reduce crash frequency on I-94 compared to a Replace-in-Kind alternative¹⁴ (see Section 3.3.2.4). In the Hawley Road to Mitchell Boulevard segment, the At-grade alternative with no Hawley Road interchange would have 29 percent fewer crashes on I-94 than the Replace-in-Kind option, the At-grade alternative with half interchange at Hawley Road (preferred alternative) would have 23 percent fewer crashes on I-94 than the Replace-in-Kind option, and the Double Deck alternative would have 14 percent fewer crashes on I-94 than the Replace-in-Kind option.

The full or partial removal of the Hawley Road interchange would redirect some traffic to local roadways, which would likely cause some increase in crash frequency along these streets. Combining the predicted crashes for I-94, ramps, and local streets, the Double Deck alternative is predicted to have fewer total crashes than the At-grade alternative. Over a 20-year period, the At-grade alternative with no Hawley Road interchange would have 31 percent more crashes than the Double Deck alternative, and the At-grade alternative with a half interchange at Hawley Road would have 15 percent more crashes than the Double Deck alternative. See Section 3.3.2.4 for more detailed information regarding the extent to which the alternatives improve safety.

Both the Double Deck alternative and At-grade alternative would meet this purpose and need element. The Double Deck alternative would meet this element to a greater extent than the At-grade alternative. Under the At-grade alternative, there would be no place for a disabled vehicle to pull off the freeway in the area between the cemeteries. This would increase congestion as well as potential for additional crashes as compared to the Double Deck alternative.

In the I-94 East-West Corridor Draft EIS, the At-grade alternative was listed as “partially” meeting the safety element of the project’s purpose and need due to the presence of the 11-foot lanes and narrow shoulders. These distances of 11-foot lanes were reduced from those noted in the Draft EIS due to refined design; specifically, maximizing the lane width transitions to keep the lanes as wide as possible, given available space. This reduction of the length of 11-foot lanes makes the presence of the 11-foot lanes more acceptable and results in the At-grade alternative meeting the project’s purpose and need element of addressing safety on I-94. While the At-grade alternative would have narrow lanes and shoulders between the cemeteries, mitigation measures, such as dynamic traffic management tools to warn drivers of closed lanes in the narrow segment, advance warning signs alerting drivers to the narrow lanes and narrow shoulders, and other tools like reflectors on the center median barrier wall and the outside barrier wall would likely be implemented to make the narrow lane/narrow shoulder segment as safe as possible.

Does the alternative improve I-94 operational efficiency to level of service D (overall) and provide for more predictable travel time?

Based on SEWRPC’s travel forecast, under the No-build alternative in 2040, I-94 would generally operate at level of service D to F during the morning peak hour, while generally operating at level of service E or F in

¹⁴ The Replace-in-Kind alternative provides the exact same alignment as the No-build alternative and would result in the same number of predicted crashes.

the afternoon peak hour¹⁵. As noted in Section 1.3.5, level of service was determined through the use of HCS.

Under the At-grade alternative in 2040 (both Hawley Road interchange options), I-94 will operate at level of service D in both directions during the morning peak hour. Level of service for the two interchange options would vary during the afternoon peak hour. The half Hawley Road interchange option would operate at level of service D in both directions, while the no Hawley Road interchange option would operate at level of service C to E. Eastbound I-94 from the 68th Street entrance ramp to the exit ramp to US 41/Miller Park Way (between Mitchell Boulevard and Yount Drive) would operate at level of service E during the afternoon peak hour in the design year (2040) under the At-grade alternative with no Hawley Road interchange. This area includes the narrow segment between the cemeteries with 11-foot lanes and 2-foot shoulders. WisDOT estimates that this segment would change from level of service D to level of service E between 2035 and 2040 with no Hawley Road interchange. Traffic operations would fall to a level of service E through this section under the no Hawley Road interchange option because of the narrow lanes and shoulders, the lack of an auxiliary lane, and the inability of eastbound traffic to exit I-94 at Hawley Road. The At-grade alternative with the half interchange at Hawley Road (preferred alternative) would operate at the upper end of level of service D¹⁶ in the same location because the number of vehicles exiting I-94 at Hawley Road (100 – 150 vehicles during the design year peak hours) would be enough to reduce traffic density to just below the level of service E threshold.

By meeting level of service D during both the morning and afternoon peak hours, the At-grade alternative with the half Hawley Road interchange option (preferred alternative) would meet the project's purpose and need goal of improving traffic operations. The At-grade alternative with no Hawley Road interchange option would only partially meet the project's purpose and need goal of improving traffic operations. The level of service for both At-grade alternative options would be an improvement over the No-build alternative and would result in level of service D or better for much of the corridor. However, for the At-grade alternative with no Hawley Road interchange, the portion of eastbound I-94 from the 68th Street entrance ramp to the exit ramp to US 41/Miller Park Way (just east of Mitchell Boulevard) would operate at level of service E in the afternoon peak hour.

Under the Double Deck alternative (both the all up and partially down options), in 2040, I-94 will operate at level of service C to D in the morning and afternoon peak hours. Thus, the Double Deck alternative would meet the project's purpose and need goal of improving traffic operations.

Does the alternative provide system continuity and maintain function as an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 "backbone" route, and a federal and state "long truck route"?

Both the At-grade alternative (both the no Hawley Road interchange and half Hawley Road interchange options) and Double Deck alternative (both the all up and partially down options) would maintain I-94 as a continuous 8-lane roadway, an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 "backbone" route, and a state and federal "long truck route." For the At-grade alternative, the 11-foot lanes between the cemeteries would not match driver expectations and would not meet criteria for a Federally Designated Truck Route, which calls for at least one lane to be 12 feet wide (Facilities Development Manual 11-20 1.5). Therefore, the At-grade alternative would partially meet the project's purpose and need element of system linkage and route importance. The Double Deck alternative would meet this purpose and need element.

¹⁵ The peak hour is the hour in both the morning and afternoon periods when traffic is at its heaviest. For the I-94 East-West Corridor study, the morning peak hour is 7 to 8 a.m. and the afternoon peak hour is 4:30 to 5:30 p.m. When discussing level of service in the peak hour, these are the timeframes used. Even though these are the peak hours, traffic congestion occurs outside this 1-hour.

¹⁶ The numeric level of service in this segment for the At-grade alternative with the half interchange at Hawley Road would be 4.88 in the afternoon peak hour. While this is considered level of service D, it is only slightly better than level of service E.

Under the At-grade alternative, if oversize/overweight vehicles were permitted to use I-94 through Milwaukee, the vehicles would require the use of two travel lanes through the cemetery due to the 11-foot lanes and minimal shoulders. Oversize/overweight vehicles would only be permitted to use this portion of I-94 during off-peak travel periods in order to minimize the disruption of normal traffic flow.

East Segment

Does the alternative upgrade I-94 to current design criteria, where appropriate, allowing for a minimal number of design exceptions due to environmental constraints?

The Off-alignment alternative would upgrade I-94 to current design criteria, meeting this purpose and need goal. I-94 would be straighter compared to its existing alignment east of 32nd Street, improving the driver's sight distance through this area. The On-alignment alternative would also upgrade I-94 to current design criteria, meeting this purpose and need goal. The On-alignment alternative would barely meet the minimum design criteria for stopping sight distance, while the Off-alignment alternative would exceed the minimum by a greater margin. Neither alternative would meet desirable sight distance criteria. Both alternatives would require design exceptions for stopping sight distance on some exit and entrance ramps.

For both alternatives, the new Stadium Interchange would replace the existing left-hand entrances and exits with entrances and exits on the right hand side. The ramp braiding between the Stadium Interchange and 35th Street and between 35th Street and 27th Street would improve the unsafe weaving issues in those areas.

Does the alternative address safety on I-94?

Both the Off-alignment and On-alignment alternatives would reduce crashes on I-94 by about 29 percent and 28 percent, respectively, compared to a Replace-in-Kind alternative. This is due to improved design and improved traffic operations on I-94. The Off-alignment alternative would have 1 percent fewer crashes than the On-alignment alternative. This is due to a greater improvement in the horizontal alignment under the Off-alignment alternative. The study team believes that the crash differences could be greater because the crash prediction model does not completely capture the full value of the improvements in vertical alignment of the Off-alignment alternative. Both east segment alternatives would meet the purpose and need element of improving safety.

Does the alternative improve I-94 operational efficiency to level of service D (overall) and provide for more predictable travel time?

Based on SEWRPC's travel forecast, under the No-build alternative, in 2040, I-94 would generally operate at level of service D to F during the morning peak hour while generally operating at level of service E or F in the afternoon peak hour in the east segment.

Under both the Off-alignment alternative and On-alignment alternative, in 2040, I-94 will operate at level of service C to D in the morning and afternoon peak hours. Thus, the Off-alignment alternative and On-alignment alternative would meet the project's purpose and need goal of improving traffic operations.

Does the alternative provide system continuity and maintain function as an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 "backbone" route, and a federal and state "long truck route"?

The Off-alignment alternative would maintain I-94 as a continuous 8-lane roadway, an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 "backbone" route, and a state and federal "long truck route", meeting this element of the project purpose and need. The 27th Street interchange would be reconfigured to connect all ramps directly to 27th Street.

The On-alignment alternative also would maintain I-94 as a continuous 8-lane roadway, an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 "backbone" route, and a state and federal "long truck route", meeting this element of the project purpose and need. The 27th Street interchange entrance and exit ramps remain where they are today at 25th, 26th, 28th Streets, and St. Paul Avenue.

2.2.3.3 Summary

Table 2-2 provides an overview as to how the alternatives meet purpose and need. All of the alternatives retained for detailed study would replace the deteriorating pavement on I-94. In the west segment, the At-grade alternative remained under consideration in the Draft EIS because, pending further engineering design, it would result in a No Adverse Effect determination (in accordance with Section 106 of the National Historic Preservation Act) on Calvary Cemetery, Soldiers' Home NHL, Soldiers' Home Historic District, Soldiers' Home Reef NHL, and Story Hill Residential Historic District 2 and 3. Additional design and analysis since the Draft EIS has led to a determination that, when considering all factors, the At-grade alternative with half interchange at Hawley Road, sufficiently meets the project purpose and need.

Both of the east segment alternatives retained for detailed study meet all of the purpose and need elements.

TABLE 2-2

Alternatives Retained for Detailed Evaluation against Purpose and Need

Purpose and Need Element	West Segment		East Segment	
	Double Deck (both options)	At-grade* (both options)	Off-alignment	On-alignment
Design Deficiencies <i>Does the alternative upgrade I-94 to current design criteria, where appropriate, allowing for a minimal number of design exceptions due to environmental constraints?</i>	Yes Would upgrade I-94 to current design criteria in most locations. Westbound inside and outside shoulder width would be 10 feet in the double deck portion. Would meet purpose and need goal of meeting current design standards.	Partially Would upgrade I-94 to current design criteria in most locations. Would result in 11-foot lanes and minimum 2-foot shoulders between the cemeteries, not meeting design criteria. Would partially meet purpose and need goal of meeting current design criteria.	Yes Would upgrade I-94 to current design criteria, meeting purpose and need goal.	Yes Would upgrade I-94 to current design criteria, meeting purpose and need goal.
Safety <i>Does the alternative address safety on I-94?</i>	Yes Would reduce crashes on I-94 due to improved design and improved traffic operations, meeting purpose and need goal.	Yes** Would reduce crashes on I-94 due to improved design and improved traffic operations. Although the alternative has narrow lanes and shoulders, these can be mitigated using incident management strategies and Intelligent Transportation System (ITS) installations to an extent that allows the alternative to meet the safety element of the project's purpose and need.	Yes Would reduce crashes on I-94 due to improved design and improved traffic operations, meeting purpose and need goal.	Yes Would reduce crashes on I-94 due to improved design and improved traffic operations, meeting purpose and need goal.
Traffic Volume and Operations <i>Does the alternative improve I-94 operational efficiency to level of service D (overall) and provide for more predictable travel time?</i>	Yes In 2040, I-94 would operate at level of service C to D in the morning and afternoon peak hours. Thus, the Double Deck alternative would meet the project's purpose and need goal of improving traffic operations.	Yes (half interchange at Hawley Road; Preferred Alternative)/ Partially (no interchange at Hawley Road) In 2040, I-94 would operate at level of service C to D in the morning peak hour while operating at level of service C to D for the half interchange option and level of service C to E for the no interchange option in the afternoon peak hour. The area that would operate at level of service E for the no interchange option in the	Yes In 2040, I-94 would operate at level of service C to D in the morning and afternoon peak hours. Thus, the Off-alignment alternative would meet the project's purpose and need goal of improving traffic operations.	Yes In 2040, I-94 would operate at level of service C to D in the morning and afternoon peak hours. Thus, the On-alignment alternative would meet the project's purpose and need goal of improving traffic operations.

TABLE 2-2

Alternatives Retained for Detailed Evaluation against Purpose and Need

Purpose and Need Element	West Segment		East Segment	
	Double Deck (both options)	At-grade* (both options)	Off-alignment	On-alignment
		afternoon peak hour is eastbound from the 68 th Street entrance ramp to the exit ramp for northbound US 41 and southbound Miller Park Way traffic. The half interchange option would meet the purpose and need goal of improving traffic operations while the no interchange option would partially meet the purpose and need goal of improving traffic operations.		
System Linkage and Route Importance <i>Does the alternative provide system continuity and maintain function as an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 “backbone” route, and a federal and state “long truck route”?</i>	Yes Maintains I-94 as a continuous 8-lane roadway, an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 “backbone” route, and a state and federal “long truck route.” Would meet this element of purpose and need.	Partially Maintains I-94 as a continuous 8-lane roadway, an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 “backbone” route. Does not match driver expectations and would not meet requirements for a Federally Designated Truck Route. Would partially meet this element of purpose and need.	Yes Maintains I-94 as a continuous 8-lane roadway, an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 “backbone” route, and a state and federal “long truck route.” 27 th Street interchange reconfigured to connect all ramps directly to 27 th Street. Would meet this element of purpose and need.	Yes Maintains I-94 as a continuous 8-lane roadway, an important commuter route, a link in the National System of Interstate and Defense Highways, a WisDOT Connections 2030 “backbone” route, and a state and federal “long truck route.” The alignment of the 27 th Street interchange would be the same as today. Would meet this element of purpose and need.

* The At-grade alternative, although only partially meeting the purpose and need for some elements, was retained for detailed study because, pending further engineering design, it would result in a No Adverse Effect (in accordance with Section 106 of the National Historic Preservation Act) on Calvary Cemetery, Soldiers’ Home NHL, Soldiers’ Home Historic District, Soldiers’ Home Reef NHL, and Story Hill Residential Historic District 2 and 3. In February 2015, the At-grade alternative with a half interchange at Hawley Road was identified as the preferred alternative.

** In the Draft EIS, the At-grade alternative was listed as only “partially” meeting the project’s safety purpose and need element. Since the Draft EIS was released, the design of the At-grade alternative was refined and the length of the 11-foot lane segments is shorter than identified in the Draft EIS (see Section 2.2.2.1, At-grade alternative). This shorter segment of four, 11-foot lanes would help to reduce congestion and improve safety. The At-grade alternative was determined to now “meet” the safety element of the project’s purpose and need.

2.3 Identification of Preferred Alternative

WisDOT and FHWA developed and evaluated a wide range of alternatives for the I-94 East-West Corridor. The alternatives that were retained for detailed study all improve I-94 over the existing condition. All of the alternatives would address the deteriorated condition of I-94, obsolete roadway and bridge design, existing and future traffic demand, and high crash rates.

Identification of a preferred alternative occurred after carefully reviewing input received at the public hearing and during the public availability period for the Draft EIS. Identification of the preferred alternative was based on engineering factors, impacts to the human/natural environment, cost, and input from the public, state, and federal resource agencies; Cooperating and Participating Agencies; and local officials.

Identification of a preferred alternative was also performed in accordance with the Clean Water Act's Section 404 (b)(1), Sections 106 and 110(f) of the National Historic Preservation Act as amended, and the U.S. DOT's Section 4(f) law.

The Clean Water Act's Section 404(b)(1) "Guidelines for Specification of Disposal Sites for Dredged or Fill Material" (40 CFR Part 230) is administered by USEPA and the Corps of Engineers. The guidelines mandate that dredged or fill material should not be discharged into aquatic ecosystems (including wetlands), unless no other practicable alternatives are demonstrated, that such discharge will not have unacceptable adverse impacts, and that all practicable measures to avoid and minimize adverse impacts are undertaken. WisDOT and FHWA obtained concurrence (See Section 6) from Section 404 merger agencies (for example, Corps of Engineers, USEPA, and Wisconsin DNR) on the identification of the preferred alternative/Least Environmental Damaging Practicable Alternative (LEDPA) prior to the Final EIS.

Sections 106 and 110(f) of the National Historic Preservation Act as amended (54 USC 306108 and 54 USC 306107, respectively) requires federal agencies "to the maximum extent possible undertake such planning and actions as may be necessary to minimize harm" to historic properties and to afford the Advisory Council on Historic Preservation reasonable opportunity to comment on such undertakings. Consultation under Section 106 and Section 110(f) is ongoing. Prior to letting the construction contract, WisDOT and FHWA will enter into a Programmatic Agreement with the State Historic Preservation Officer (SHPO) and other signatories to stipulate measures to avoid adverse effects to the Soldiers' Home NHL and other identified historic properties in the project area. These stipulations will include future design coordination and reviews with SHPO, the National Cemetery Administration, National Park Service, the Advisory Council on Historic Preservation and other consulting parties; specifications for protection during construction; actions if there are unanticipated discoveries; monitoring; and reporting requirements.

The U.S. DOT's Section 4(f) law (49 USC 303 and 23 USC 138) states that FHWA and other U.S. DOT agencies cannot approve the use of land from publicly owned parks, recreation areas, wildlife or waterfowl refuges, or public and private historic sites unless it is determined that there is no feasible and prudent alternative to the use of land from such properties, and the action includes all possible planning to minimize harm to the property resulting from such use. Section 4(f) also helped guide the decision making process.

The Draft EIS did not identify a preferred alternative. After carefully evaluating project purpose and need, cost, impacts to the human/natural environment, and public and agency comments received throughout the NEPA process and in direct response to the Draft EIS, **WisDOT and FHWA identified the At-grade alternative with the half interchange at Hawley Road in the west segment and the On-alignment alternative in the east segment as the preferred alternative.**

As part of the preferred alternative in the west segment, WisDOT would construct some off-interstate improvements to mitigate the traffic impacts of partially closing the Hawley Road interchange (**Exhibit 2-9**). These improvements are extending Washington Street to make it easier for drivers in the Hawley Road corridor to access the 68th Street/70th Street interchange and improvements at three local road intersections to improve local road operations under the partial closure of the Hawley Road interchange.

Existing Washington Street is about 0.5 mile south of I-94 and currently intersects with 70th Street on the west and dead ends a few blocks to the east. It provides access to several businesses. A new Washington Street alignment would be constructed to provide a connection between 70th Street and Hawley Road/60th Street. The existing portion of Washington Street would remain, but a new roadway alignment to the north of existing Washington Street would be constructed to provide the most efficient connection between 70th Street and Hawley Road/60th Street, while minimizing impacts to existing businesses (**Exhibit 2-10**). Connecting 70th Street to Hawley Road/60th Street via Washington Street would provide convenient access to and from Hawley Road from the 68th Street/70th Street interchange for traffic that would no longer be able to enter I-94 eastbound or exit I-94 westbound at Hawley Road. The Washington Street extension would cost approximately \$18 million (2014 dollars) and would require the relocation of WisDOT's Southeast Region Service Facility.

In addition to the Washington Street connection, three local roadway intersections have been identified for potential upgrades to improve local road operations under the partial closure of the Hawley Road interchange. Each of the intersections would see a modest increase in traffic volumes as a result of the access change at Hawley Road.

The local road intersections are:

- 70th Street/Greenfield Avenue (**Exhibit 2-11**)
- National Avenue/Greenfield Avenue (**Exhibit 2-12**)
- Miller Park Way/National Avenue (**Exhibit 2-13**)

At the 70th Street/Greenfield Avenue intersection, WisDOT would restripe the existing lane configuration to extend the southbound left turn lane and improve the traffic signals to improve traffic operations. No right-of-way would be required for the improvements (**Exhibit 2-11**).

At the National Avenue/Greenfield Avenue intersection, WisDOT would restripe the existing lane configuration and improve the traffic signals. Along National Avenue, northeast-bound National Avenue would be restriped to provide for a combined left and through lane, along with a right turn lane. This improvement would eliminate approximately 100 feet of on-street parking. For southwest-bound National Avenue, a combined left and through lane, along with a right turn lane, would be provided. This improvement would eliminate approximately 150 feet of on-street parking. Along Greenfield Avenue, a left turn lane and a combined through lane and right turn lane would be provided in each direction. This would result in the loss of about 70 feet of parking along westbound Greenfield Avenue (**Exhibit 2-12**).

At the Miller Park Way/National Avenue intersection, WisDOT would restripe traffic lanes and improve traffic signals. A second left turn lane would be added to northbound Miller Park Way. Along National Avenue, west of Miller Park Way, the second westbound through lane would be extended by 500 feet to a spot between 45th and 46th Streets. In addition, a right-turn lane would be provided from westbound National Avenue to the VA entrance at General Mitchell Boulevard/47th Street. This was requested by the VA to improve access to their campus and would improve traffic operations along National Avenue. As part of the improvement, approximately 0.6 acre from the VA Campus, including 0.2 acre of the Soldiers' Home NHL, would be required for transportation right-of-way (**Exhibit 2-13**). Through the Section 106 consultation, it was determined that there is No Adverse Effect to the Soldiers' Home NHL (see Section 3.24 for more information). Additionally, the impacts to the Soldiers' Home NHL property would be considered *de minimis* under Section 4(f) (see Section 4 for more information).

Improvements at the three local road intersections would cost about \$5 million (2014 dollars). Bicycle and pedestrian accommodations will be provided on local roads that are reconstructed as part of the project, in accordance with U.S. DOT's bicycle and pedestrian accommodation policy. I-94, Miller Park Way, and US 41 will have no bicycle or pedestrian accommodations. Reconstructed portions of Zablocki Drive will also have no separate bicycle facility because traffic volumes are low enough to allow for bicycles on the street, and

widening Zablocki Drive to provide additional bicycle and pedestrian accommodations may have an adverse impact on the Soldiers' Home NHL. The new north frontage road between Yount Drive and Mitchell Boulevard will have an existing trail parallel to it, making an additional bicycle facility unnecessary.

Appropriate TSM and TDM measures are included as part of the identified preferred alternative. The following TSM measures are already in place along or near the I-94 East-West corridor and will remain in place as part of the preferred alternative:

- Ramp metering
- Traffic detectors
- Freeway monitoring/advisory information
- Incident management

WisDOT typically assesses whether, and which, additional TSM elements may be added to the freeway during the final design phase.

TDM measures that are currently in use and would be implemented as part of the I-94 East-West Corridor project include preferential treatment for HOVs at metered freeway entrance ramps, park-and-ride lots, and rideshare promotion to encourage alternatives to single occupancy vehicle travel.

2.3.1 Basis for Identification of Preferred Alternative

2.3.1.1 West Segment

The **At-grade alternative with a half interchange at Hawley Road** (access to and from the west) was identified as the preferred alternative for the west segment of the I-94 East-West Corridor project. The basis for identifying the At-grade alternative with a half interchange at Hawley Road as the preferred alternative is as follows:

- Addresses existing and future traffic demand
 - Results in level of service D or better for the entire corridor in the project's design year (2040).
- Addresses safety on I-94
 - Reduces crashes on I-94 compared to existing condition due to improved design, traffic operation improvements, and elimination of the Mitchell Boulevard interchange and movements to and from the east at the Hawley Road interchange, reducing turbulence (traffic entering and exiting I-94).
 - Although the At-grade alternative with a half interchange at Hawley Road would have more crashes overall when taking into account crashes on local roads as a result of some traffic diverting off the freeway, crash prediction analysis predicts this alternative would result in less overall crashes on I-94 and the Hawley Road interchange ramps combined, than the Double Deck alternative. The Double Deck alternative maintains all four ramp movements from the Hawley Road interchange on auxiliary lanes, which results in more overall crashes. A large portion of crashes attributed to the Double Deck alternative is due to these weaving movements as part of the interchange at Hawley Road with full access. While the number of crashes is an important factor, other factors such as cost, impacts to historic resources, and public input are also considered.
 - Entrance and exit ramps at the 68th Street/70th Street interchange would be constructed longer than the existing ramps to provide more length and time for traffic entering and exiting I-94, improving safety and traffic operations.
 - Removing the Mitchell Boulevard interchange decreases congestion within the cemetery area and eliminates the left-hand entrances and exits including very short and unsafe merge distances between those ramps on I-94.
 - Narrow lanes and shoulders generally result in an increase in crashes; however, the 11-foot lane segment is short (30 feet), with transitions to 12-foot lanes on each end. This segment would have

narrow shoulders for approximately 1,500 feet. In order to make the narrow lanes and shoulders segment as safe as possible, dynamic traffic management tools to warn drivers of closed lanes in the narrow segment, advance warning signs alerting drivers to the narrow lanes and narrow shoulders, and other tools like reflectors on the center median barrier wall and the outside barrier wall will be investigated in final design and implemented as appropriate.

- No Adverse Effect on historic properties

- FHWA has determined that this alternative can be constructed to result in No Adverse Effect under Section 106 and 110(f) on all historic properties in the study area. The Double Deck alternative would have an Adverse Effect on Calvary Cemetery and the Soldiers' Home NHL and Historic District, and a potential Adverse Effect on Story Hill Residential Historic District 2 and 3.
- The National Park Service recommended that the At-grade alternative be identified as the preferred alternative because it would have No Adverse Effect on surrounding historic properties and costs less than the Double Deck alternative (Appendix E; E-3).
- The Section 106 consulting parties are concerned about the visual impact of the Double Deck alternative.
- FHWA has determined that the local road improvement element of this alternative can be constructed to result in a No Adverse Effect under Section 106 and 110(f) on the two historic properties adjacent to the local road improvements, the former Paradise Theater and the Soldiers' Home NHL.
- A Programmatic Agreement will be developed between FHWA, the SHPO, and other signatories to stipulate measures to avoid or minimize adverse impacts to the Soldiers' Home NHL and other identified historic properties in the project area. These stipulations will include future design coordination and reviews with SHPO, the National Cemetery Administration, National Park Service, the Advisory Council on Historic Preservation and other consulting parties; specifications for protection during construction; actions if there are unanticipated discoveries; monitoring; and reporting requirements..
- Under the At-grade alternative, noise levels would remain similar to the existing condition, but would still exceed the noise level criteria at some locations in Story Hill Residential Historic District 2 and 3. The areas exceeding the noise abatement criteria are eligible for consideration of noise barriers. If the benefitted receptors vote for a noise barrier, the noise barrier may be considered a Section 106 adverse effect. In accordance with the Programmatic Agreement, FHWA will coordinate the Noise Barrier Design Plan with the SHPO and other signatories and consulting parties to determine if the design and placement of the noise wall would have an adverse visual impact on the setting of the historic district and, if so, specify appropriate mitigation measures to minimize the impact, such as aesthetic treatments or landscaping.

- Minimal impact to Section 4(f) properties.

- Results in *de minimis* use of Soldiers' Home NHL and Historic District.
- No permanent use of Mitchell Boulevard Park.
- If the benefitted receptors in Story Hill Residential Historic District 2 and 3 vote for a noise barrier, the noise barrier would most likely be constructed within Story Parkway boundaries. A final decision on the construction of a noise barrier adjacent to the district may be made prior to completion of the ROD or during the final design phase. If the noise barrier is constructed, FHWA has made a preliminary determination that there would be no more than a *de minimis* impact of Story Parkway as a result of project actions. FHWA will finalize this determination in the ROD.. WisDOT and FHWA have solicited input from Milwaukee County Parks on this preliminary determination (Appendix E, E-

19). Milwaukee County Parks Department declined to comment on FHWA's preliminary determination at this time. Further coordination with the Parks Department will occur prior to ROD approval.

- Less residential displacements
 - Results in 5 residential displacements, as opposed to 10 with the Double Deck alternative.
 - Results in a tax base loss that is approximately 40 percent less than the Double Deck alternative tax base loss.
- Less cost
 - Approximately \$147 million (2014 dollars) less than the Double Deck alternative all up option and \$72 to \$197 million less than the Double Deck alternative partially down option.
 - The Double Deck alternative would cost about \$1.2 million more per year to maintain than the At-grade alternative.
- Constructability
 - The At-grade alternative with a half interchange at Hawley Road would result in fewer impacts to traffic during construction. The Double Deck alternative would take longer to construct, resulting in a longer duration of impacts to I-94 traffic.
- City of Milwaukee input
 - The City of Milwaukee opposes any double decking of I-94 where the top level or deck is elevated.
 - The City of Milwaukee is concerned about the increased residential impacts and loss of tax base associated with the Double Deck alternative over the At-grade alternative.
- City of West Allis input
 - The City of West Allis preferred retaining full access at the Hawley Road interchange, but is more supportive of the At-grade alternative with a half interchange at Hawley Road as opposed to the At-grade alternative with no Hawley Road interchange.
 - The City of West Allis supported the Washington Street extension to provide convenient access to and from Hawley Road from the 68th Street/70th Street interchange for traffic that would no longer be able to enter I-94 eastbound or exit I-94 westbound at Hawley Road.
- Public input
 - Those who live near I-94 in the project area and have provided comments on the project generally support the At-grade alternative due to less residential impacts, retaining the existing viewshed, and a perceived reduction in noise from the Double Deck alternative.

2.3.1.2 East Segment

The **On-alignment alternative** was identified as the preferred alternative for the east segment of the I-94 East-West Corridor project. The On-alignment and Off-alignment alternatives are similar in addressing existing and future traffic demand, and both improve safety on I-94. The basis for identifying the On-alignment alternative as the preferred alternative is as follows:

- Less cost
 - Approximately \$100 million (2014 dollars) less than the Off-alignment alternative.
- Less employee relocations
 - The On-alignment alternative avoids relocating INTEC, while the Off-alignment alternative would relocate the business. INTEC employs about 40 people.

- Maintains more direct access to the Menomonee Valley.
 - Maintains existing ramp alignment at the 25th/26th/28th Street interchange. People would access the Menomonee Valley from I-94 the same way they do today.
 - The reconfigured 27th Street interchange under the Off-alignment alternative changes access to the Menomonee Valley, as motorists would turn to the north at 27th Street and then be required to make two right turns (St. Paul Avenue and 25th Street).
- Familiar traffic patterns near 25th/26th/28th Street intersection
 - Traffic patterns would remain the same at this intersection, maintaining access that drivers are familiar with and resulting in less reassignment of travel routes.
- Responds to public feedback in keeping full access at the 35th Street interchange.

2.4 Foundation of Alternatives Development

2.4.1 Regional Planning Context

WisDOT, FHWA, and local governments are partners with SEWRPC in the regional transportation planning process. Recommendations made in the adopted *Regional Transportation System Plan for Southeastern Wisconsin: 2035* (SEWRPC 2006a, updated and reaffirmed in June 2014) serve as the basis for further evaluation and implementation of a wide range of transportation improvements by the appropriate local or state agency. As noted in the plan's introduction, SEWRPC's regional transportation planning is closely coordinated with WisDOT's statewide transportation planning to ensure consistency with statewide transportation plans and forecasts. At least every 4 years, FHWA and the Federal Transit Administration (FTA) must jointly verify that the metropolitan transportation planning process is being carried out in accordance with applicable provisions of federal law. The SEWRPC metropolitan transportation planning process was last certified in 2012 (<http://www.sewrpc.org/SEWRPC/Transportation/2012-Certification-Review.htm>).



The regional transportation system plan is designed to serve the land use plan and the forecast future travel demand derived from the population and employment growth and development pattern envisioned in the regional land use plan. As part of the regional transportation planning process, SEWRPC designed, tested, and evaluated three transportation-planning scenarios: No-build, TSM, and TSM plus arterial street and highway expansion. The planning scenarios were specifically structured to ensure that full and adequate consideration was given to resolving transportation problems through land use, public transit, bicycle and pedestrian facilities, TSM, and Transportation Demand Management (TDM) measures prior to considering highway projects that would widen existing arterial streets and highways or build new highways. Each scenario incrementally builds on the previous scenario by adding various elements of the regional land use and transportation plans.

The planning scenarios are summarized in the following subsections. Detailed information is provided in the regional transportation system plan.

2.4.1.1 No-build Plan Scenario

SEWRPC's No-build Plan scenario would maintain the existing transportation system, including the existing public transit system as it existed in 2005, resurface and reconstruct arterial streets and highways without additional traffic lanes, and operate and manage the transportation system as it was operated and managed

in 2005. The No-build Plan scenario was developed to evaluate the operation of the existing transportation system under projected future population and employment growth and planned development patterns. Under this scenario, traffic congestion in the region would be expected to double by 2035.

2.4.1.2 Transportation Systems Management Plan Scenario

SEWRPC's TSM plan scenario evaluated public transit, bicycle, pedestrian facilities, TSM, and TDM to determine the extent to which the *combined* elements could address future transportation needs and resolve traffic congestion problems prior to recommending any capacity expansion on the arterial street and highway system. Under the TSM plan scenario, congestion is expected to almost double by 2035.

Elements of the TSM plan scenario are summarized in the following subsections.

Public Transit

The public transit element of SEWRPC's regional transportation plan recommends increasing existing rapid transit by over 200 percent, introducing a new express transit service, and expanding existing local transit service by approximately 59 percent. Overall, the proposed public transit service levels recommended in the regional transportation plan represent a 100 percent increase over the service levels that existed in 2005. SEWRPC's 2014 review of the regional transportation plan reaffirmed the regional transportation planning process and the vision for a 100 percent increase in transit, while acknowledging this increase in transit is not likely to happen without a change in funding levels.

Rapid transit bus service would consist of buses operating over freeways connecting the Milwaukee central business district with other urbanized areas and outlying counties in the region. Rapid transit bus service would include the I-94 corridor from downtown Milwaukee to Waukesha and Oconomowoc. Characteristics of the service include the following:

- Service would operate in both directions throughout the day and evening, providing traditional and reverse-commute service. Frequency would be 10 to 30 minutes during weekday peak travel periods and 30 to 60 minutes during off-peak periods and on weekends.
- There would be some intermediate stops spaced about 3 to 5 miles apart to increase accessibility to employment centers and for reverse-commute travel from residential areas within central Milwaukee County. The stops would provide connections with express and local transit service, or shuttle bus and van service to nearby employment centers.

Express transit bus service would consist of a grid of limited-stop, higher-speed routes located largely within Milwaukee County. The routes would connect major employment centers and shopping areas, as well as other major activity centers, such as General Mitchell International Airport, tourist attractions, entertainment centers, and residential areas. The express routes would replace existing major local bus routes and would initially consist of buses operating over arterial streets in mixed traffic. The service would be upgraded over time to buses operating on reserved street lanes with priority treatment at traffic signals. The proposed express transit service would have the following characteristics:

- Service would operate in both directions during all periods of the day and evening, providing both traditional and reverse-commute service. Frequency would be about every 10 minutes during weekday peak **hours** and 20 to 30 minutes during off-peak periods and on weekends.
- Stops would be about 0.25 mile apart in the Milwaukee central business district, and about 0.5 mile apart in outlying areas.
- The overall travel speed provided would be about 16 to 18 miles per hour, a significant improvement over the average 12 miles per hour speed provided by the existing local bus transit service.

Local bus transit service would consist of local buses operating over arterial and collector streets, with frequent stops throughout the Kenosha, Milwaukee, and Racine urbanized areas. Service would be provided

on weekdays, evenings, and weekends. Proposed improvements would include expanded service areas, and increased hours of operation and frequency, particularly on major local streets.

While the regional transportation plan recommends that rapid and express transit service initially be provided with buses, the plan envisions that rapid transit could ultimately be upgraded to commuter rail and that express transit could be upgraded to bus guideway or light rail service. Conceptual bus guideway and commuter rail alignments are shown on Map 93 in the regional transportation plan. The TSM plan scenario included the impact of upgrades to rapid and express transit.

Corridor studies and subsequent preliminary engineering would need to be conducted to determine whether to implement fixed guideway facilities (commuter rail or light rail/bus guideways). At the request of the local government and transit operator sponsor, SEWRPC would formally amend the regional plan to include the fixed guideway.

Bicycle and Pedestrian Facilities

The bicycle and pedestrian element of the regional transportation plan is intended to promote safe accommodation of bicycle and pedestrian travel, and to encourage bicycle and pedestrian travel as an alternative to personal vehicle travel. The plan recommends considering and implementing bicycle lanes, widened outside travel lanes, and shoulders or bicycle paths if feasible when the surface arterial street system in the region is reconstructed. The plan also recommends a system of approximately 575 miles of off-street bicycle paths between the Kenosha, Milwaukee, and Racine urbanized areas, and in other cities and villages in the region with a population of at least 5,000 people.

The pedestrian element of the regional transportation system plan is envisioned as a policy plan rather than a system plan. It recommends that agencies and local governments responsible for constructing and maintaining pedestrian facilities adopt and follow recommended standards and guidelines when developing the facilities, particularly within planned neighborhood units. The standards include providing sidewalks in urban areas.

Transportation Systems Management

The TSM element in SEWRPC's regional transportation plan includes measures to manage and operate existing transportation facilities to their maximum carrying capacity and travel efficiency. Measures to help alleviate congestion include freeway traffic management, surface arterial and highway traffic management, major activity center parking management, and guidance.

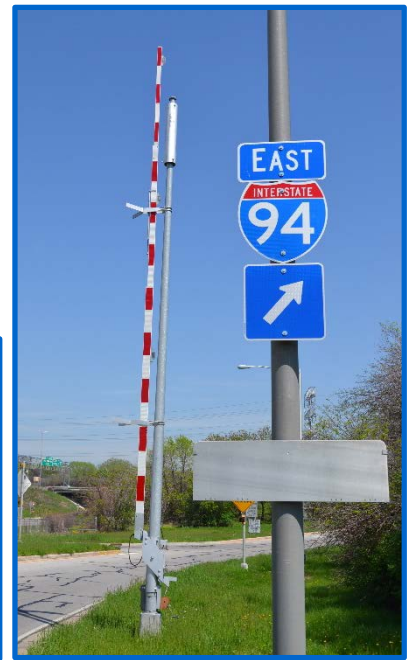
The following are specific regional transportation plan recommendations related to freeway traffic management:

- **Operational control**—Measures to improve freeway operation during average weekday rush hours and during traffic incidents, including monitoring freeway operating conditions; controlling entering freeway traffic; and using traffic detectors to measure traffic speed, volume, and density.



- **Advisory information**—Readily available information on travel conditions and travel times so motorists can choose more efficient travel routes, resulting in a more efficient transportation system. Information sources include variable message signs and WisDOT's website, which shows traffic congestion, incident locations, and views of the freeway system from closed-circuit television cameras. WisDOT has also implemented a regional "511" call-in number that allows the public to get information about current travel conditions and construction.

- **Incident management**—Timely detection, confirmation, and removal of freeway incidents through the use of closed-circuit television, enhanced freeway location reference markers, freeway service patrols, crash investigation sites, ramp closure devices, and alternate route designations.



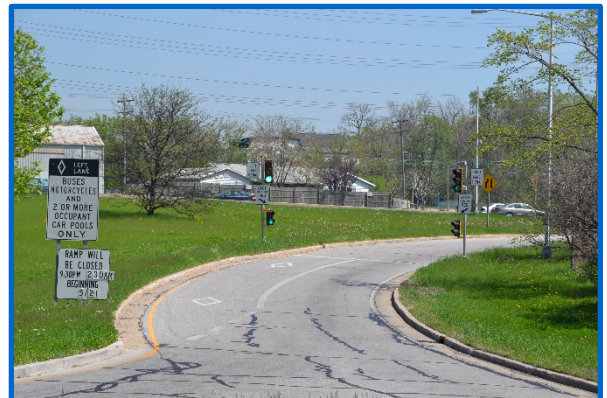
- **Arterial street and highway traffic management**—Improve the operation and management of the regional surface arterial and highway network through improved traffic signal coordination, intersection traffic engineering improvements, curb-lane parking restrictions, access management, and advisory information.

Travel Demand Management

The TDM element in SEWRPC's regional transportation plan includes ways to reduce personal and vehicular travel or to shift such travel to alternative times and routes, allowing for more efficient use of the existing transportation system's capacity. The regional transportation plan recommends seven specific TDM measures: preferential treatment for high-occupancy vehicles (HOV), park-and-ride lots, transit pricing, personal vehicle pricing, TDM promotion, transit information and marketing, and detailed site-specific neighborhood and major activity center land use plans.

Key TDM measures that WisDOT can implement are:

- **Preferential treatment for HOV**—Intended to efficiently move transit vehicles, vanpools, and carpools on the existing highway system. Such treatments include HOV bypass lanes at metered freeway on-ramps, reserved bus lanes along congested streets and highways, transit priority signal system, and dedicated parking for carpools and vanpools. Currently, there are HOV bypass lanes on about half of the metered freeway on-ramps in Milwaukee County. Reserved bus lanes like those along Bluemound Road in Waukesha County allow buses to bypass traffic backups at traffic signals. Expanded use of reserved lanes is recommended on congested streets and highways.
- **Park-and-ride lots**—Intended to promote carpooling and serve public transit. Park-and-ride lots are recommended along all major routes at major intersections and interchanges where sufficient demand to warrant them is anticipated.



- **TDM promotion**—Envisioned as a region-wide program to encourage alternatives to drive-alone personal vehicle travel. The program would aggressively promote transit use, bicycle use, ridesharing, pedestrian travel, telecommuting, and work-time rescheduling, including compressed workweeks. It would also include education, marketing, and promotion components. WisDOT has implemented a rideshare program that matches potential carpoolers based on route and personal preferences.

2.4.1.3 Transportation Systems Management Plus Highway Plan Scenario

SEWRPC's TSM plus highway plan scenario includes the following: public transit, bicycle, and pedestrian facilities; TSM; and TDM elements from the TSM plan scenario, plus arterial street and highway improvements that are recommended to address the residual congestion that is not expected to be alleviated by the TSM elements alone. Under the TSM plus highway plan scenario, the projected doubling of congestion could be avoided and year 2035 congestion could be modestly less than current levels of weekday congestion.

The TSM plus highway plan scenario is the recommended alternative in the 2035 Regional Transportation System Plan and was confirmed in the 2010 and 2014 reviews of the plan. The recommended arterial street and highway capacity expansion, including expansion of I-94 to 8 lanes between the Marquette interchange and the Zoo Interchange, represents about a 10 percent increase in capacity of the arterial and highway system in southeastern Wisconsin. The 2035 regional transportation plan included a full interchange at Hawley Road and did not reflect the relocation of the access provided by the existing Mitchell Boulevard interchange to a new location within the Stadium Interchange. On September 16, 2015, SEWRPC amended the 2035 regional transportation plan to:

- Convert from full to half interchange at Hawley Road
- Remove existing interchange at Mitchell Boulevard
- Provide service ramps to non-arterial roadways at the Stadium Interchange

In selecting the TSM plus highway plan scenario, SEWRPC'S Advisory Committee on Regional Transportation System Planning (local officials and agency representatives who guide and direct the regional planning process) emphasized that proposed highway improvements, including preservation projects, would need to undergo environmental studies and preliminary engineering by responsible state, county, or municipal governments before implementation. The I-94 East-West Corridor Study by WisDOT and FHWA serves this purpose.

Individual corridor studies for highway improvements grow out of recommendations in the regional transportation plan. Some elements of the alternatives analysis for the individual corridor studies need to rely on analysis completed as part of the regional transportation planning process. This is because some alternatives need to be implemented more broadly than in a specific highway corridor to be effective (for example, managed lanes, increased mass transit).

Analysis of TSM and TDM alternatives for individual corridor studies needs to rely on the regional planning process in order to assess the effectiveness of the alternatives. WisDOT has implemented most of the TSM elements (specifically the freeway traffic management measures) recommended in the regional transportation plan. The TSM elements will remain in place regardless of any improvements made to I-94. The benefits of TSM elements evaluated and implemented on a corridor-specific basis are enhanced by TSM elements that are in place throughout the Milwaukee-area freeway system (see Section 2.5.2). WisDOT has also implemented TDM elements within its control, such as park-and-ride lots, HOV lanes at select on ramps, and its rideshare program (see Section 2.4.1.2).

WisDOT also relies on the regional transportation plan when assessing public transit elements. As the plan recommends, transit service would need to be enhanced within a broader area (for instance, between downtown and Waukesha County) to be most effective.

The TSM plan scenario evaluated in the regional transportation plan assessed whether a 100 percent increase in transit service throughout the region, along with a more desirable land use pattern, would address congestion/serve forecast future travel demand within the region without adding any capacity to arterial streets and highways. SEWRPC determined that a 100 percent increase in transit *and* adding capacity to certain roadways is required to address congestion in the region. SEWRPC's 2014 review of the regional transportation plan reaffirmed the regional transportation planning process and the vision for a 100 percent increase in transit, while acknowledging this increase in transit is not likely to happen without a change in funding levels.

The regional transportation system plan considers each element to be of equal priority, and each element needs to be implemented to provide a comprehensive, multi-modal, and balanced high-quality transportation system in southeastern Wisconsin. WisDOT accepts the conclusions and recommendations in the regional transportation plan for the following key reasons:

- WisDOT was involved in the regional planning process as a member of the advisory committee, guiding the regional transportation planning process.
- Many cities and counties in the region were represented on the regional transportation plan's advisory committee that guided the regional transportation planning process and voted to accept its conclusions.
- The 21-member SEWRPC Commission, representing all seven counties in the region, also adopted the regional transportation plan.
- SEWRPC's 4th generation regional travel demand model is the most effective method available in the region for evaluating travel demand. Both WisDOT and SEWRPC monitor the effectiveness of the model's travel predictions with actual traffic counts throughout the region. For detailed information regarding the specific inputs that are part of SEWRPC's regional travel demand model, please see Chapter VI of SEWRPC's 2035 regional transportation plan (http://www.sewrpc.org/SEWRPC/VISION_2050/2050RegLandUseTranspPlan.htm).

SEWRPC's 4th generation travel demand models were revalidated and recalibrated using new data provided by a major origin and destination travel survey completed within the region in 2001. The models were revalidated for years 2000–2001 by using U.S. Census data and 2001 transportation network data, and comparing model estimates of trip generation, trip distribution, highway traffic, and transit ridership to estimates derived from travel surveys and actual traffic and transit ridership counts. The validation indicated that the models were able to accurately replicate not only observed trip generation, travel patterns, modal choice, and VMT¹⁷ data, but also model-estimated individual arterial street traffic volumes within 10 percent of the actual average weekday vehicular traffic. The models were validated again in 2011 for year 2008 using year 2008 estimates of households, population, employment, and transportation network data, and comparing estimates of arterial VMT and transit ridership to model estimates derived from actual traffic and transit ridership (SEWRPC 2012). SEWRPC is in the process of updating their travel demand model to coincide with the release of the year 2050 regional plan.

The regional traffic forecasts are a key factor in evaluating alternatives for street and highway improvements. The forecasts assume that all components of the TSM plan scenario have already been implemented at the regional level. In other words, the traffic forecasts for the I-94 corridor and other highways in the southeastern Wisconsin region represent the “residual traffic” that will continue to use the street and highway system and contribute to increasing congestion and safety concerns, even after full implementation of the public transit, bicycle and pedestrian, TSM, and TDM elements. See Sections 2.5.2 and 2.5.3 for more information on the public transit, TSM, and TDM elements applicable to the I-94 corridor.

¹⁷ VMT is an output of SEWRPC's regional travel demand model. It is used as one check of the model's accuracy. VMT is a measure of traffic as users navigate through the available network and conditions.

As noted in FHWA’s Technical Advisory 6640.8A, *Guidance for Preparing and Processing Environmental and Section 4(f) Documents*, it is appropriate for WisDOT to rely on SEWRPC’s evaluation of transit options conducted as part of the regional transportation planning process (FHWA 1987). The technical advisory states that reasonable and feasible transit options should be considered on all proposed major highway projects in urbanized areas with over 200,000 people, even though such options may not be within FHWA’s funding authority. The technical advisory goes on to say that consideration of this alternative [transit] may be accomplished by reference to the regional or area transportation plan, where that plan considers mass transit, or by an independent analysis during early project development.

The regional transportation plan identifies the need for capacity expansion of I-94 in the study area. However, even with a demonstrated need for capacity expansion at the regional level, project-specific non-capacity expansion improvements, including public transit, are still considered by WisDOT to determine whether the purpose and need for this project could be met without capacity expansion. Public transit recommendations are also considered in order to ensure the preferred alternative will not preclude planned transit improvements and will allow implementation of regional transportation plan recommendations of benefit to public transit that can be considered within the scope of this project, such as HOV lanes at freeway entrance ramps.

2.4.2 Public and Agency Input

The results of the regional planning process were used as a starting point for developing alternatives. Then, public and local government input from the first PIM in August 2012 was used to identify an initial range of reasonable alternatives.

Public and agency input followed FHWA’s collaborative environmental review process under 23 United States Code (USC) 139. Through the Coordination Plan, Impact Analysis Methodology, and other forums, the environmental review process provides several opportunities for the public and agencies to provide input on the alternatives and their impacts. Sections 2.6 and 2.7 include summaries of how agency and public input on Section 2 was obtained. Sections 5 and 6 provide more information on public and agency input.

2.5 Other Alternatives Considered and Dismissed

Section 2.2 describes the alternatives retained for detailed evaluation. This section describes the other alternatives developed and evaluated by FHWA and WisDOT that made it through the first alternatives screening, but were ultimately dismissed from consideration. Appendix A documents alternatives that were developed and evaluated, but were eliminated during the first alternatives screening. The foundation of the alternatives development process is described in Section 2.4. Based on this process, the initial range of alternatives was developed and considered by FHWA and WisDOT for the I-94 East-West Corridor study:

- No-build alternative (discussed in Section 2.2)
- Region-wide TSM elements (the preferred alternative will include TSM elements, but it has been dismissed from consideration as a stand-alone alternative)
- Region-wide public transit and TDM elements (the preferred alternative will include TDM elements, but it has been dismissed from consideration as a stand-alone alternative)
- Build alternatives
 - Replace-in-kind
 - Spot improvements
 - Modernization alternatives (6- and 8-lane)

Each is summarized in the following subsections.

The alternatives were assessed based on their ability to meet the project’s purpose and need (see Section 1, Purpose and Need for the Project). Each was assessed by its ability to satisfy the following factors:

- *Maintain a key link in the local, state, and national transportation network.* Sections 1.3.1 and 1.3.2 describe the project in the context of the regional transportation planning process and the role of I-94 in the local, regional, and national transportation network.
- *Address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes.* This includes potentially replacing left-hand entrances and exits, and providing proper weaving distances between exit and entrance ramps. Section 1.3.3 describes the crash history in the corridor, and Section 1.3.4 describes outdated design aspects in the study corridor.
- *Replace deteriorating pavement.* Section 1.3.4.1 describes the poor condition of the pavement on I-94. The original pavement from the 1960s is still in place. Although there have been three pavement overlays, each has a shorter life span than the previous overlay.
- *Accommodate existing and future traffic volumes at an acceptable level of service.* Section 1.3.5 describes current congestion on I-94 during the morning and afternoon rush hours and how congestion will worsen in the future.

In addition to each alternative's ability to meet the project's purpose and need, the alternatives were assessed on their construction cost and ability to avoid or minimize impacts to the natural and built environment. Each alternative was also evaluated based on comments each alternative received from local governments, resource agencies, and the public. WisDOT and FHWA obtained input at five rounds of PIMs, two public hearings, and through numerous small-group meetings with neighborhood, environmental, community and business groups, elected officials, and local government staff.

The results of the alternatives screening are summarized in the following subsections. They are shown graphically in **Exhibit 2-14** to aid your review.

2.5.1 Definition of Reasonable Alternatives

The Council on Environmental Quality's regulations for implementing National Environmental Policy Act (NEPA) require an EIS to include detailed analysis of *reasonable alternatives* (40 *Code of Federal Regulations* [CFR] 1502.14): "In determining the scope of alternatives to be considered, the emphasis is on what is 'reasonable' rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant." The term "reasonable alternatives" is generally understood to mean alternatives that address project purpose and need, and that avoid, minimize, or mitigate overall social, environmental, and economic impacts to the extent practicable.

2.5.2 Region-wide TSM Elements

The TSM plus highway plan scenario that was the recommended alternative in the 2035 Regional Transportation System Plan is a combination of TSM elements, TDM elements, and street and highway improvements, including capacity expansion. The TSM and TDM elements have either already been implemented or will continue to be implemented over time.

The following TSM elements are already in place on the southeastern Wisconsin freeway system, including the I-94 corridor in Milwaukee County:

- **Ramp Metering**—Traffic signals on freeway entrance ramps to control the rate of vehicle entry onto the freeway to reduce congestion on the adjacent freeway segment and downstream freeway system. To encourage ridesharing and transit use, preferential access for HOVs is provided at some ramp meter locations to allow the HOVs to bypass traffic waiting at a ramp meter signal. Buses and HOVs currently receive preferential access at some of the 120 ramp meter locations in southeast Wisconsin. A WisDOT study found a 3 to 4 percent increase in freeway travel speeds after ramp meters were installed on US 45 in Milwaukee County (WisDOT 2004). A 2002 study of the Minneapolis-St. Paul freeway system

during a 6-week shutdown of freeway ramp meters found a 22 percent increase in freeway travel times and a 7 percent reduction in freeway speeds (Cambridge Systematics 2002).

- **Traffic Detectors**—Devices embedded in the pavement at 0.5-mile intervals on the freeways in Milwaukee County and on I-94 in Waukesha County, and at 1- to 2-mile intervals on I-94 in Racine and Kenosha counties. Data are used to detect travel speed and time, traffic congestion, traffic flow breakdowns and incidents, and to regulate ramp meters.
- **Freeway Monitoring/Advisory Information**—WisDOT uses variable-message signs to provide real-time information to travelers on downstream freeway traffic conditions, current travel times to selected areas, and information on lane and ramp closures. There are 23 variable-message signs on the freeway system, primarily in the Milwaukee area. There are also 13 variable-message signs on surface arterials that connect to the freeway system, primarily in Milwaukee County.
- **Incident Management**—Timely detection, confirmation, and removal of freeway incidents is accomplished through the use of the following:
 - Closed-circuit television cameras provide live video images to WisDOT and the Milwaukee County Sheriff's Department, allowing for rapid confirmation of congested areas, incident location, and immediate determination of the appropriate response. There are currently 83 closed-circuit television cameras on the southeastern Wisconsin freeway system covering the Milwaukee County freeways, I-94 and US 41/45 in Waukesha County, and I-94 in Racine and Kenosha counties.
 - Crash investigation sites are designated safe zones where motorists can go if they are involved in a crash or an incident on the freeway. There are 35 crash investigation sites on the southeastern Wisconsin freeway system, with the largest concentration (70 percent) in Milwaukee County.
 - Enhanced mile-marker reference posts (with highway shield and mile number) assist motorists in identifying specific locations along the freeway when reporting incidents. Enhanced reference markers are currently provided in the freeway median at 1/10-mile intervals on US 45 from the Zoo Interchange to the Milwaukee-Waukesha County line, on I-94 from the Mitchell Interchange to the Wisconsin-Illinois state line and on I-94 in Waukesha County.
 - Freeway surface patrols consist of specially equipped vehicles designed to assist disabled motorists and to clear disabled vehicles from the freeway. The patrols currently operate in Milwaukee County and in a limited role on I-94 in Waukesha, Racine, and Kenosha Counties. In each of the counties, service patrols operate during weekday peak traffic hours. In Milwaukee County, service patrols also operate all day during weekdays. Each service patrol in Milwaukee County covers 70 miles of freeway.

TSM and TDM elements are already part of the proposed arterial street and highway improvements identified in the regional transportation plan. As noted, several TSM elements are already implemented on I-94 in the study area. WisDOT typically assesses whether, and which, additional TSM elements may be added to the freeway during the final design phase.

The travel demand forecasts used for the study assume full implementation of the recommended region-wide TSM elements and the preferred alternative will include existing and potential additional project-specific TSM elements.

Given that almost all of the recommended TSM elements are already implemented and congestion is still expected to reach level of service E and F in the design year, TSM will not, as a stand-alone alternative, address the project's purpose and need. Therefore, it has been eliminated from consideration as a stand-alone alternative.

2.5.3 Region-wide Public Transit and TDM Elements

WisDOT and FHWA considered the transit element of the regional transportation plan and did not develop or evaluate a transit alternative beyond that recommended in the regional plan. The regional transportation plan's recommendation for additional express transit, rapid transit, and local transit was deemed a

comprehensive plan by WisDOT and FHWA, negating the need for WisDOT and FHWA to develop their own transit alternative.

SEWRPC independently concluded in its regional plan that doubling transit revenue service miles in the region would not eliminate the need to add capacity on I-94. If doubling of transit service revenue miles as recommended in the regional transportation plan is not implemented, then personal vehicle travel demand may be higher than estimated in the plan.

Implementing the transit element of the regional plan is outside WisDOT's jurisdiction, except for park-and-ride lots and HOV lanes on freeway entrance ramps (discussed below). Setting that issue aside, WisDOT and FHWA considered how much more express bus transit service, beyond what is already in the regional plan, would be needed to avoid having to add capacity on I-94 in the study area. Milwaukee County Transit System's Freeway Flyer routes, Coach USA's bus service (subsidized by Waukesha County) from Goerke's Corners (I-94 and Barker Road in Waukesha County), and the Washington County Commuter Express to downtown Milwaukee are considered express transit.

The following are two key points to consider when discussing increases in express bus transit ridership:

- Increasing bus *service* does not necessarily increase *ridership* at the same rate. In other words, increasing bus service by 100 percent would not necessarily increase ridership by 100 percent.
- Serving downtown workers by transit is relatively easy because a large concentration of jobs are in the Milwaukee central business district and many of the commuters use their own vehicle to get to a park-and-ride lot. Approximately 4 percent of regional transit trips are to Milwaukee's central business district (Brown and Neog 2012). Serving the reverse commuters that are traveling from the City of Milwaukee to Milwaukee County suburbs or Waukesha County is more difficult because the jobs are dispersed in a larger area (Public Policy Forum 2013).

About 700 people use transit in the I-94 corridor in the morning and **afternoon** peak hour based on data from transit providers in early 2013. Almost all are traveling east in the morning and west in the **afternoon** because express bus service is set up to serve these trips. If increased transit ridership alone¹⁸ were to avoid the need to add a lane to I-94, transit ridership on eastbound I-94 in the morning rush hour and westbound I-94 in the **afternoon** rush hour would need to increase about three-fold, to between 2,000 trips (eastbound) and 2,200 trips (westbound), to avoid the need to add capacity (one freeway lane can carry a maximum of 2,000 to 2,100 vehicles in an hour).

With the traffic split on I-94 near 50/50, the increase in transit ridership would need to occur not only among people commuting to downtown in the morning and leaving downtown in the afternoon. There would have to be a similar number of transit users among reverse commuters traveling west in the morning and east in the afternoon. Transit ridership on eastbound I-94 in the **afternoon** peak hour would need to increase from almost none today to about 2,000 trips in the peak hour. Currently, there is little to no eastbound transit service on I-94 in the **afternoon** peak hour; however, the regional transportation plan recommends establishing reverse commute express bus service. Considering that the traditional eastbound morning and westbound **afternoon** commute serves 700 riders in the peak hour, it is unlikely that express bus transit service for the harder-to-serve reverse commute could attract 2,000 riders in the peak hour.

Without a strong incentive to use transit, such as increased downtown parking rates, decrease in car ownership, or something that significantly increases the cost of commuting by single-occupancy vehicle, it will be difficult to achieve the dramatic increase in transit ridership required to avoid the need to add capacity. These incentives are outside WisDOT's jurisdiction.

For TDM elements, WisDOT evaluated the transit projects included in the regional transportation plan to assess whether implementing them could satisfy the need to add capacity on I-94 in the study area. WisDOT

¹⁸ Drivers could also divert to local streets, change the time of their trip on I-94 to before or after the peak hour, or not make the trip. The point of this exercise is to demonstrate that increasing transit is unlikely to preclude the need for additional capacity on I-94.

evaluated this by assessing traffic operations on a 6-lane Modernization Alternative to determine if it would operate at an acceptable level of service (D or better) in the design year peak hour, assuming all the regional plan's recommended transit projects were included. The results of that analysis indicate that several segments of I-94 would operate at level of service E and F if a 6-lane Modernization Alternative and all transit projects from the regional transportation plan were implemented (see Section 2.5.5.1).

Another component of WisDOT's project-specific analysis of transit is whether reconstructing I-94 would preclude implementation of any of the recommended transit projects (**Table 2-3**). It was found that reconstructing I-94 would not preclude implementation of any recommended transit projects. Lastly, WisDOT assessed whether reconstructing I-94 in the study area would enhance any of the recommended transit projects. A rapid bus route on I-94, like MCTS's Freeway Flyer, would benefit from improved safety and reduced congestion.

TDM elements would not address the following project purpose and need factors:

- *Maintain a key link in the local, state, and national transportation network.* Increased congestion and crashes would decrease I-94's ability to serve as a key transportation route.
- *Address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes.* TDM as a stand-alone alternative would not address the obsolete design of I-94.
- *Replace deteriorating pavement.* TDM as a stand-alone alternative would not address the deteriorated pavement on I-94.
- *Accommodate existing and future traffic volumes at an acceptable level of service.* TDM as a stand-alone alternative would not address existing and future congestion. This segment of I-94 would not have an acceptable level of service.

Therefore, TDM, as a stand-alone alternative, will not address the project's purpose and need and has been eliminated from consideration as a stand-alone alternative.

The regional transportation plan does not recommend bus lanes or HOV lanes on I-94. Therefore, the Modernization Alternatives discussed in this section would not physically preclude the plan's recommended transit service from being implemented. WisDOT has jurisdiction to implement TSM measures and capacity expansion on I-94 and the current study includes TSM. WisDOT does not have the authority to implement transit capital improvements or operation activities, such as adding bus routes and providing funding for those routes and drivers (see inset on pages 2-43 and 2-44). If a build alternative is identified at the conclusion of this study, it will be a combination of TSM plus modernization pursuant to the regional transportation plan.

How is Transit in Milwaukee Funded and what is WisDOT's role?

Implementing the public transit recommendations from the regional transportation plan depends on funding availability and commitments at the federal, state, and local levels, as well as fluctuations in revenue over time. For example, state funding to the Milwaukee County Transit System (MCTS) increased by 29 percent from 1995 to 2000, and by another 7 percent between 2000 and 2005. Although overall transportation funding has decreased, from 2014 to 2015 state transit funding increased by 4.0 percent and has remained constant. The state's 2015-2017 biennial budget maintained state transit funding at \$113.5 million for both FY 2015-2016 and 2016- 2017. Federal operating funds come from the FTA, and state funds are allocated through the biennial budget process. WisDOT administers the federal and state transit operating funds based on annual budget requests submitted by transit system providers. WisDOT does not operate or contract for public or specialized transit service. For public transit systems, local governments either operate the service themselves or contract out to private providers. The day-to-day operations of public transit systems in Wisconsin are funded from passenger revenues (user fees), state and federal funds, and local funds (typically property taxes). Federal law limits the use of federal funding for operating costs for public transit systems in areas with a population over 200,000 population (Milwaukee and Madison). All FTA funding for Milwaukee County is provided directly from FTA to the county. WisDOT does not administer any of the funds.

The regional transportation plan notes that implementation of the recommended public transit expansion depends on the continued commitment of the state to be a partner in the maintenance, improvement and expansion, and attendant funding of public transit. The state has historically funded 40 to 45 percent of transit operating costs.

Implementation of the recommended expansion of public transit in Southeastern Wisconsin would also depend on attaining dedicated local funding for public transit. In the absence of dedicated local funding, a continued decline in transit service may be expected to occur. The local share of funding of public transit in southeastern Wisconsin is provided through county or municipal budgets, and represents about 15 percent of the total operating costs and 20 percent of total capital costs of public transit. Thus, the local share of funding public transit is largely provided by property taxes, and public transit must annually compete with mandated services and projects and other community priorities. Increasingly, due to the constraints in property-tax-based funding, counties and municipalities have found it difficult to provide funding to address transit needs, and to respond to fluctuations in federal and state funding. Most public transit systems nationwide have dedicated local funding, typically a sales tax of 0.25 to 1.0 percent, and are not nearly as dependent upon federal and state funding. A sales tax provides funding that should increase with inflation and area growth, thereby addressing funding needs for public transit and transit system expansion.

In November 2008, Milwaukee County residents passed an advisory referendum for a 1.0 percent sales tax, including a 0.5 percent sales tax for public transit. Wisconsin Governor Doyle included in the proposed 2009–2011 state budget in the spring of 2009 regional transit authority legislation, including a 0.5 percent sales tax for regional transit systems. The Joint Finance Committee modified the Governor's proposal to include dedicated sales tax funding for MCTS and a three-county commuter rail authority in southeastern Wisconsin to be funded with vehicle rental fees. The Governor vetoed MCTS-dedicated funding, indicating the need for regional transit systems and authorities, and that he would be proposing a compromise to regional transit authority legislation in the spring 2010 legislative session. During the spring 2010 legislative session, as the review, update, and reaffirmation work on the year 2035 regional transportation plan was at completion, including the attendant air quality conformity assessment, the Governor again proposed regional transportation authority legislation, including a 0.5 percent sales tax for regional transit systems, but the legislation failed on a very close vote in the State Assembly.

Continued from previous page

Given the views of some stakeholders on recent freeway improvement projects in the Milwaukee, Racine, and Kenosha urbanized areas that WisDOT should fund transit-specific elements of such projects (HOV lanes and ramps, enhanced local and express bus service, and rail-based transit), it is important to understand WisDOT's statutory role in administering transportation improvements. While WisDOT administers federal and state transit capital and operating funds for projects initiated by others, it has no authority to serve as the lead agency in developing transit capital improvement projects. Chapter X [ten], Plan Implementation, of the regional transportation plan identifies the specific roles and responsibilities of local, state, and federal agencies in implementing the regional plan.

It is also important to recognize that strategies that would accommodate and improve public transit service (bus-only lanes, HOV lanes, commuter rail, bus-on-shoulder operations during peak hours, and others) are intended to function over substantial roadway lengths rather than at spot locations, and in many cases on multiple highways. For such strategies to be effective, they must be continuous between major connection points if any significant reduction in travel demand is to be realized. In other words, a regional strategy for implementing transit is necessary.

Until or unless a regional transit strategy is developed, funded, and implemented at this magnitude on a broad portion of the regional freeway network by the parties authorized to do so by statute, the recommendations contained within SEWRPC's Regional Transportation Plan will remain valid. That is, a doubling of transit usage married with possible commuter and/or light rail route(s) must be accompanied by highway improvements that include capacity expansion as an element of their reconstruction. WisDOT's role in transit, as defined by state statute, is to fund transit-operating cost at the level designated by the state budget. WisDOT cannot unilaterally implement the regional transit strategy.

TDM measures included in the regional plan that are within the scope and limits of the project will be considered and incorporated as appropriate. As has been done with other large-scale highway projects in the Milwaukee area, WisDOT will fund additional transit routes, as warranted, to mitigate impacts to traffic within the project area during the construction phase of the project.



TABLE 2-3
Project-specific Transit Evaluation

2035 Regional Transportation Plan Transit Project (either recommended for implementation or potential project for study)	Does I 94 East West project preclude this project from occurring?	Will the transit project preclude the need for additional lanes along I-94?	Will the I 94 East West project enhance the transit project
Rapid Bus Route—I-94 through study area.	No	No	Yes. Improved safety and travel time
Rapid Bus Route—US 41/Miller Park Way through study area.	No	No	Yes. Improve safety and travel time
Rapid Bus Route—North limit at 70 th Street and I-94. Travels south on 70 th Street to WIS 59 to National Avenue.	No	No	No
Express Bus Route—Follows Wisconsin Avenue north of I-94.	No	No	No
Express Bus Route—Crosses I-94 at 27 th Street.	No	No	No
Transit Station with Parking—I-94 at 68 th Street/70 th Street exit.	No	No	No
Transit Station without Parking—At Miller Park.	No	No	No
Potential Commuter Rail—Using Canadian Pacific rail line that crosses I-94 just east of Stadium Interchange.	No	No	No
Potential Bus Guideway/Light Rail—An east-west line north of I-94 along Wisconsin Avenue/ Bluemound Road/State Street corridor.	No	No	No
Potential Electric Bus Guideway—A loop along Wisconsin Ave., along US 41 north of Stadium Interchange, and along Canal Street.	No	No	No

2.5.4 Build Alternatives

As discussed in Section 1, the regional transportation plan recommends improvements to I-94, including possible capacity expansion, in conjunction with the TSM and TDM measures discussed in Sections 2.4.1.3. The regional plan also states that WisDOT will perform an environmental study (this study) and preliminary engineering to develop and evaluate specific improvement options, including capacity expansion and alternative ways to provide it.

The following build alternatives were developed based on the regional transportation plan and various forms of public and agency involvement and with thorough consideration of adjacent development, socioeconomic factors, and environmental constraints:

- Replace-in-Kind alternative—Replace I-94 in its current configuration.
- Spot Improvements alternative—Replace I-94 in (or close to) its current configuration while addressing safety issues that can be fixed with little or no new right-of-way acquisition (includes building auxiliary lanes, braided ramps, and/or C-D roads and reconfiguring or eliminating specific interchanges).
- 6-lane Modernization alternative—Replace and reconfigure I-94 to address safety issues described in Section 1, Purpose and Need for the Project, without adding a fourth lane in each direction.

- 8-lane Modernization alternative—Same as the 6-lane Modernization alternative, while also adding one new lane in each direction to address safety and congestion, as described in Section 1, Purpose and Need for the Project.

The build alternatives also include reconstructing existing service interchanges with I-94 in the study area (68th Street /70th Street interchange, Hawley Road interchange, Mitchell Boulevard interchange, 35th Street interchange, 25th/26th/28th Street interchange, and reconstructing the study area's only system interchange, the Stadium Interchange (I-94/US 41/Miller Park Way).

2.5.4.1 Replace-in-Kind Alternative

Under this alternative, the freeway's pavement and bridges would be replaced in their current configuration.

While the Replace-in-Kind alternative replaces the freeway's deteriorated pavement, it would not address the purpose of and need for the project with respect to safety concerns, existing freeway design deficiencies, and future traffic demand. The Replace-in-Kind alternative is projected to operate at a level of service D to F during peak traffic hours by 2040. Furthermore, it would be inconsistent with regional transportation system plans that document the importance of I-94 for the safe and efficient movement of people, goods, and services and a regional transportation system designed to meet the travel needs of southeastern Wisconsin.

While it would replace deteriorated pavement, have minimal environmental impacts, and have lower construction cost than other build alternatives, the Replace-in-Kind alternative would or would not address the following project purpose and need factors:

- *Maintain a key link in the local, state, and national transportation network.* Increased congestion and crashes would decrease I-94's ability to serve as a key transportation route.
- *Address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes.* This alternative would not address substandard design elements that contribute to crashes.
- *Replace deteriorating pavement.* This alternative would replace existing pavement.
- *Accommodate existing and future traffic volumes at an acceptable level of service.* This alternative would not sufficiently accommodate existing and future traffic volumes.

The Replace-in-Kind alternative is essentially the same as the No-build Plan that was developed and evaluated by SEWRPC in the 2035 Regional Transportation Plan. The No-build Plan was characterized as maintaining the existing transportation system, including the existing public transit system, as it existed in base year 2005. This alternative was not found to be a viable option for addressing future traffic demand in southeastern Wisconsin. Additionally, no local governments and only a few members of the public have advocated for this alternative as part of the current I-94 East-West Corridor study.

The Replace-in-Kind alternative is not considered a reasonable course of action and has been removed from consideration.

2.5.4.2 Spot Improvements

The Spot Improvements alternative would replace the freeway's pavement and bridges in or close to their existing configuration, while addressing safety issues that can be fixed with little or no new right-of-way acquisition. It would meet some, but not all, current design standards. Several possible spot improvements are shown in **Exhibit 2-15**. The spot improvements are independent of each other, meaning that all or some could be implemented. Possible spot improvements include the following:

- Add auxiliary lanes between Hawley Road and 68th Street.
- Eliminate the left-hand exits/entrances at Mitchell Boulevard and replace with right-hand exits.

- Add a fourth lane in each direction through the cemetery segment (with narrow lanes and shoulders) and eliminate the Mitchell Boulevard interchange with I-94.
- Replace left-hand exits/entrances with right hand exits/entrances in the Stadium Interchange.
- Braid ramps to allow traffic to merge effectively between the Stadium Interchange and 35th Street, and reconfigure ramps at 35th Street to eliminate connection to Park Hill Avenue.
- Eliminate the 35th Street interchange with I-94.
- Add C-D road to eliminate weave on westbound I-94 between the 28th Street entrance ramp and the 35th Street exit ramp.
- Widen shoulders where needed (35th Street eastbound entrance ramp, eastbound I-94 between 35th Street and 27th Street, 26th Street-St. Paul Avenue exit ramp).

While the spot improvements (separate or combined) would replace deteriorated pavement, have fewer environmental impacts, and have lower construction cost than the other build alternatives, they would or would not address the following elements of the project's purpose and need as follows:

- *Maintain a key link in the local, state, and national transportation network.* Increased congestion and crashes would decrease I-94's ability to serve as a key transportation route.
- *Address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes.* This alternative would address some design deficiencies, such as left-hand exits/entrances, but would not address others, such as short weaving distances.
- *Replace deteriorating pavement.* This alternative would replace existing pavement.
- *Accommodate existing and future traffic volumes at an acceptable level of service.* While this alternative may improve traffic operations in specific locations, it would not accommodate future traffic volumes in the project's design year of 2040.

Further, the improvements previously listed are similar to the TSM elements discussed in the regional transportation plan (WisDOT uses the term Spot Improvements, whereas SEWRPC refers to them as TSM). For example, improved traffic signal coordination, intersection improvements, such as adding turn lanes and replacing signalized intersections with roundabouts, curb lane parking restrictions, and access management. The spot improvements were recommended in combination with other TSM and TDM elements. SEWRPC already analyzed the combination of TSM and TDM elements and recommended capacity expansion on this segment of I-94 to address residual congestion that would not be addressed by TSM and TDM elements.

Therefore, no further evaluation is required for the spot improvements alternative in terms of its ability to meet project purpose and need when combined with other TSM and TDM elements.

2.5.5 Modernization Alternatives

This section describes Modernization Alternatives that were evaluated and dismissed from consideration. The alternatives meet the project's purpose and need (except for the 6-lane Modernization alternatives, discussed in Section 2.5.5.1) and were dismissed because another alternative that also met purpose and need had fewer impacts and/or lower cost.

To aid your review, Exhibit 2-14 shows the screening of alternatives in each segment.

The alternatives discussed in this section were initially arranged into four segments—west, cemetery, Stadium Interchange, and east—and were presented to the public, local governments, and resource agencies that way in 2012 and 2013. As noted in Section 2.2, the four segments were consolidated into two segments in 2014. Generally, alternatives are interchangeable with the adjacent segment's alternatives.

This section discusses the alternatives that were shown to the public at the December 2012, May 2013, July 2013, and/or June 2014 PIMs and December 2014 Public Hearings. In May 2013, WisDOT and FHWA offered

Cooperating and Participating Agencies the opportunity to review and comment on the range of alternatives considered. An alternatives update meeting with Cooperating and Participating Agencies also occurred in January and June 2014.

Exhibit 2-14 displays the screening timeline. Other Modernization Alternatives considered and dismissed during the initial alternative screening phase and not displayed at the PIMs are described in Section 2.5.6 and Appendix A.

2.5.5.1 Comparison of 6-lane and 8-lane Modernization Alternatives

A key decision made during this study was whether to improve the level of service on I-94 by adding a fourth through-lane in each direction or reconstructing it as a 6-lane freeway. During the initial alternatives screening phase, both options were considered.

The 6-lane alternatives would be narrower and, therefore, less expensive than the 8-lane alternatives because they would have one less traffic lane in each direction. However, the addition of a fourth through lane in each direction accounts for only about 10 percent of the entire cost of the project. Approximately 35 percent of the total estimated program cost for the preferred alternative is related specifically to the replacement of all pavement and bridges, while over 50 percent is associated with safety and geometric improvements.

In the cemetery segment, having 8 lanes would require either: (1) 2-foot shoulders and 11-foot-wide lanes (FHWA and WisDOT have adopted AASHTO's *A Policy on Design Standards - Interstate Systems* [2005] standard freeway lane widths of 12 feet and consideration of 12-foot paved shoulders where truck traffic exceeds 250 DHV in the design year), or (2) a double deck with one set of freeway lanes on top of the other, which is more costly than the typical arrangement of freeway lanes next to each other at ground level.

The 6-lane Modernization alternatives would have greater congestion on I-94, interchange ramps, and weave segments, and therefore a lower level of service compared to the 8-lane alternatives. **Exhibit 2-16** illustrates the locations where the 6-lane Modernization alternatives would experience level of service E or F in the design year peak hour.

The 6-lane Modernization Alternatives would meet some elements of the project's purpose and need, partially meet some, and would not meet others, as indicated by the following:

- *Maintain a key link in the local, state, and national transportation network.* Increased congestion would decrease I-94's ability to serve as a key transportation route.
- *Address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes.* This alternative would address most design deficiencies.
- *Replace deteriorating pavement.* This alternative would replace existing pavement.
- *Accommodate existing and future traffic volumes at an acceptable level of service.* While this alternative would improve traffic operations compared to the No-build alternative, it would not accommodate future traffic volumes in the project's design year of 2040.

The 6-lane Modernization alternatives would meet the following element of the project's purpose and need: replace deteriorating pavement. The 6-Lane Modernization alternatives would partially meet the following elements of the project's purpose and need: maintain a key link in the local, state, and national transportation network and address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes. The 6-Lane Modernization alternatives would not meet the following element of the project's purpose and need: accommodate existing and future traffic volumes at an acceptable level of service (some areas would operate at level of service E or F).

The 6-lane Modernization alternatives would cost more than the Spot Improvements alternatives and less than the 8-lane Modernization alternatives. Right-of-way acquisition and residential/commercial/

institutional displacement impacts would be less than, though comparable to, the 8-lane Modernization alternatives' impacts.

The 8-lane Modernization alternatives would meet all the purpose and need elements: maintain a key link in the transportation network, address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes, replace deteriorating pavement, and accommodate existing and future traffic volumes at an acceptable level of service.

The City of Milwaukee has stated its opposition to adding lanes to I-94 as part of the I-94 North-South and Zoo Interchange projects. Several discussions with City staff and aldermen who represent the area reiterate that position regarding the I-94 East-West corridor. During the public involvement process, public input was split, with a number of stakeholders favoring each side of the capacity expansion issue. There was no clear consensus.

WisDOT and FHWA decided to eliminate the 6-lane Modernization alternatives from consideration because they would not meet the project's purpose and need related to providing level of service D or better traffic operations in the 2040 design year (the 6-lane Modernization Alternative results in levels of service E and F at several locations, see **Table 2-4** and **Exhibit 2-16**). The decision to eliminate this alternative is consistent with the 2035 regional transportation plan that recommends adding capacity to I-94.

TABLE 2-4

Areas of I-94 that Would not Meet Level of Service D under 6-lane Modernization

Location	Level of Service during Morning Peak Hour, year 2040	Level of Service during Afternoon Peak Hour, year 2040
I-94 eastbound, between Hawley Road exit ramp and 70 th Street entrance ramp ¹⁹	E	F
I-94 eastbound between 70 th Street entrance ramp and ramps to Stadium Interchange (at Mitchell Boulevard)	D	E
I-94 eastbound near 35 th Street exit ramp	E	D
I-94 eastbound near 35 th Street entrance ramp	E	E
I-94 eastbound near 27 th Street entrance ramp	E	D
35 th Street entrance ramp I-94 eastbound	F	F
I-94 westbound near 27 th Street exit ramp	D	E
I-94 westbound between 35 th Street exit ramp and 27 th Street entrance ramp	E	E
I-94 westbound between 27 th Street entrance ramp and ramps to Stadium Interchange (at 38 th Street)	D	E
I-94 westbound near Hawley Road entrance ramp	E	E
I-94 westbound exit ramp to Hawley Road	D	E

As a reminder, the alternatives discussed in this section (Section 2.5.5) are arranged into four segments—west, cemetery, Stadium Interchange, and east—and were presented to the public, local governments, and resource agencies that way in 2012 and 2013. As noted in Section 2.2, the four segments were consolidated into two segments in 2014. Generally, alternatives are interchangeable with the adjacent segment's alternatives.

¹⁹ The 70th Street entrance ramp is "downstream" of the Hawley Road exit ramp under the Modernization Alternatives because a C-D road would be built.

2.5.5.2 70th Street to Hawley Road (former West Segment) Modernization Alternatives

The west segment was defined as I-94 from 70th Street to the Hawley Road interchange in 2012-2013 (see **Table 2-1**). One of the operational and safety concerns in this segment is the substandard weaving distance between the 68th Street/70th Street and Hawley Road interchanges.

Cross sections for the west segment alternatives displayed at the PIMs are shown in **Exhibit 2-17**.

WisDOT evaluated the following alternatives for the west segment:

- Modernization Alternative W1 (Braided Ramps)
- Modernization Alternative W2 (C-D Roads) (*Part of west segment Double Deck alternative. See Section 2.2*)
- Modernization Alternative W3 (One-Way Frontage Roads)
- Modernization Alternative W4 (Adjacent 2-Way Arterial)

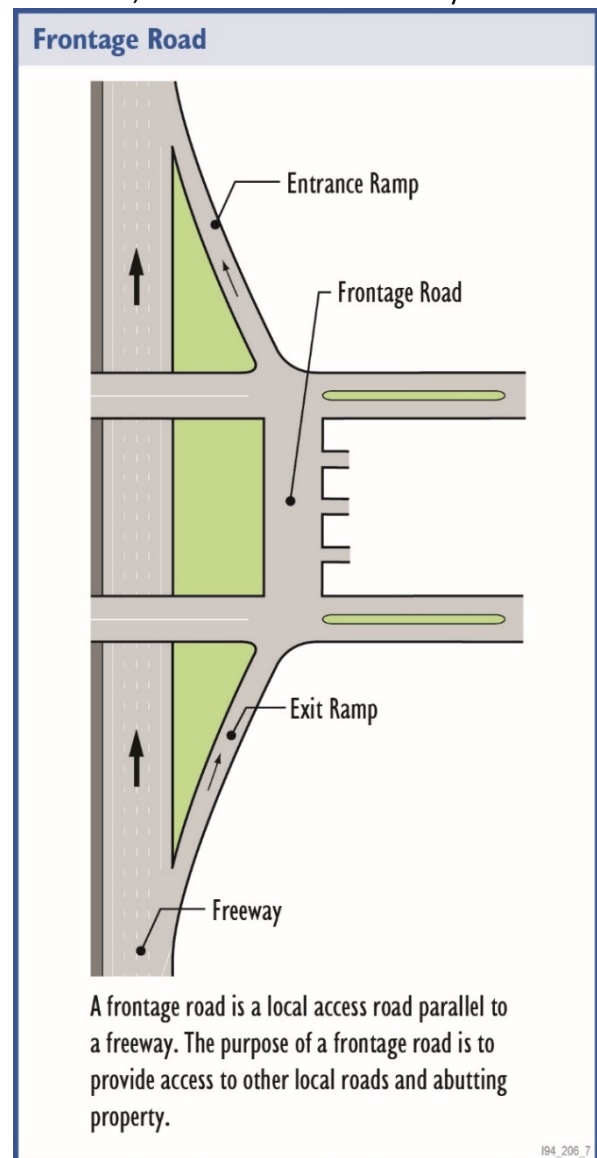
Alternatives W1, W3, and W4 would be compatible with the Double Deck alternative in the adjacent cemetery segment. Alternatives W1, W3, and W4 were all designed to improve safety between the 68th Street ramps and the Hawley Road ramps. Under the At-grade alternative, there would be no Hawley Road ramps and therefore no need for braided ramps, frontage roads, or an arterial connecting those two interchanges.

Modernization Alternative W1 (Braided Ramps)— ELIMINATED FROM FURTHER CONSIDERATION

- Would maintain freeway access at Hawley Road, 68th Street, and 70th Street; level of service satisfies purpose and need objectives; eliminates weave between 68th Street/70th Street and Hawley Road ramps.
- 68th Street/70th Street and Hawley Road interchanges would be reconstructed, and their entrance/exit ramps braided (**Exhibit 2-18**). Braided ramps would eliminate weaving on I-94 between the two interchanges, while providing direct access to and from I-94.
- Drivers entering the freeway at 68th Street/70th Street would no longer be able to exit at Hawley Road and vice versa.
- Braiding the ramps would make the freeway wider and higher, which could be partially accommodated by using the power line corridor north of the freeway, but 31 residences would be displaced on the south side of I-94.
- Eastbound I-94 would operate at level of service D for the 8-lane alternative in the 2040 peak hour; westbound I-94 would operate at level of service D or better.

Modernization Alternative W3 (One-Way Frontage Roads)— ELIMINATED FROM FURTHER CONSIDERATION

- 68th Street/70th Street and Hawley Road interchanges would be reconstructed and connected by two frontage roads (**Exhibit 2-19**). Frontage roads would eliminate weaving on I-94 between 68th Street and Hawley Road, while providing access to I-94.



- Eliminated from consideration because it would cost \$20 million more than Alternative W2 (C-D roads) and would displace more residences (31 versus 8) than Alternative W2. Alternative W2 is part of the Double Deck alternative discussed in Section 2.2.
- Eastbound traffic on I-94 destined for Hawley Road would pass through signalized intersections at 70th and 68th Streets before reaching Hawley Road. Westbound traffic destined for 70th Street would pass through signalized intersections at Hawley Road and 68th Street before reaching 70th Street.
- Eliminated from further consideration because the frontage roads would not carry traffic as efficiently as the braided ramps or C-D roads due to the signalized intersections. The frontage roads would operate at level of service E or F. In order to provide acceptable level of service, the width of the frontage roads would result in right-of-way impacts greater than those of the braided ramps or C-D roads.

Modernization Alternative W4 (Adjacent 2-Way Arterial)—ELIMINATED FROM FURTHER CONSIDERATION

- 68th Street/70th Street and Hawley Road interchanges would be reconstructed and connect to a 2-way arterial adjacent to the north side of I-94 (**Exhibit 2-20**). The 2-way arterial would carry traffic between 70th Street/68th Street and Hawley Road.
- The arterial would eliminate weaving on I-94 between 68th Street and Hawley Road, while providing access to I-94.
- Eliminated from further consideration because the adjacent arterial would operate at level of service E or F in the 2040 peak hour, not satisfying purpose and need objectives. More right-of-way acquisition would be required at the Hawley Road interchange than other alternatives.

2.5.5.3 Cemetery Segment Modernization Alternatives

The cemetery segment was defined as I-94 from the Hawley Road interchange to Mitchell Boulevard.²⁰ There are three cemeteries directly adjacent to I-94 in this segment. On the north side of I-94, the Beth Hamedrosh Hagodel Cemetery abuts the freeway east of Hawley Road. On the south side, the Spring Hill Cemetery abuts the freeway in roughly the same location. East of those two cemeteries, the Wood National Cemetery (part of the Soldiers' Home NHL and Soldiers' Home Historic District) is located on both sides of I-94, abutting the freeway right-of-way.

At its narrowest point, existing I-94 right-of-way is approximately 110 feet wide through this segment. When the original 6-lane freeway was built in 1960 and 1961, 42 graves were moved to accommodate construction. Currently, between Hawley Road and Mitchell Boulevard, the freeway has three 12-foot lanes in each direction, outside shoulders ranging from 2 to 12 feet in width, and 2-foot inside shoulders. WisDOT guidelines, based on AASHTO design criteria, for interstate highways with 6 or more total lanes calls for a minimum of 12-foot inside and outside shoulders when there will be more than 250 trucks in the design year (2040) peak hour.

Prior to June 2013, Wisconsin State Statute 84.014 stated that "... no southeast Wisconsin freeway rehabilitation project may include the addition of any lane for vehicular traffic on I-94 adjacent to Wood National Cemetery, between Hawley Road and the Stadium Interchange, in Milwaukee County." The 2013–2015 Wisconsin State Budget removed the above-referenced restriction on adding a lane to I-94 between Hawley Road and the Stadium Interchange.

Coordination with the VA and with representatives of the Beth Hamedrosh Hagodel and Spring Hill cemeteries has highlighted significant concerns regarding grave disturbance and/or relocation. Each has strongly requested that FHWA and WisDOT place the highest priority possible on avoiding direct impacts to the cemeteries, including both physical encroachment into burial areas and any cantilevering (overhanging)

²⁰ The Mitchell Boulevard interchange is discussed in the Stadium Interchange segment, Section 2.5.5.4.

of freeway lanes over burial plots. As a result of this coordination, both FHWA and WisDOT have determined that direct construction impacts to or above graves will be avoided. No graves will be relocated.

Cemetery Segment At-grade Modernization Alternatives

Alternatives that reconstruct the freeway “At-grade” (at ground level, without bridges or tunnels) were developed to avoid direct impacts to the cemeteries. WisDOT determined that at least 4 freeway lanes in each direction are necessary to address existing and future traffic volumes through this segment. WisDOT studied a 6-lane replace-in-kind alternative through the cemetery segment, connecting with **Modernization Alternatives** on each end of this segment. This alternative would not address substandard design elements (inside shoulder width) that contribute to crashes and would not sufficiently accommodate future traffic volumes. As a result, it was dropped from consideration.

As noted in Section 2.2, there would either be no Hawley Road interchange or a half interchange under the At-grade alternatives because there would be no room to safely provide westbound exit and eastbound entrance ramps without moving graves or extensive residential displacements.

An At-grade alternative, with full 12-foot lanes and full inside and outside shoulders, was considered and eliminated from further consideration as a result of its direct impact to graves, and impacts to the Soldiers’ Home NHL and Soldiers’ Home Historic District. Approximately 160 feet of total right-of-way would be required to build this alternative and therefore require land acquisition from all three abutting cemeteries, with grave relocations. It would also require acquisition of land from the Soldiers Home NHL and Soldiers’ Home Historic District.

An alternative looking at lowering the roadway a few feet was studied. Lowering the At-grade alternative would require new retaining walls on both sides of the freeway and would be challenging to construct due to the existing retaining wall’s location next to the mausoleum in Spring Hill Cemetery. A significant amount of space is typically needed to build a retaining wall. Due to the proximity of the graves within the cemetery, the mausoleum in particular, there is no room behind the existing wall to construct a new wall; therefore, a new wall would need to be constructed in front of the existing retaining wall. The width of the new walls reduces the available width for reconstruction of the freeway. For example, a 3-foot-wide retaining wall on both sides of the freeway reduces the available reconstructed roadway width by 6 feet. This would reduce the shoulder widths to less than 2 feet and/or the lane widths to less than 11 feet. Although technically feasible up to a maximum of 6 feet, lowering I-94 under the At-grade alternative would be challenging to construct, take more time to construct, and further reduce the available width for the proposed 8 lanes and shoulders.

An At-grade alternative with narrow lanes and shoulders to avoid moving graves or acquiring property from the cemeteries remains under consideration. See Section 2.2.

Cemetery Segment Double Deck Modernization Alternatives

A double-deck freeway between the cemeteries would increase freeway capacity, while avoiding right-of-way acquisition from the cemeteries and is safer than the At-grade alternative. A double deck would also allow the Hawley Road interchange to remain. Double Deck alternatives considered in this segment include the following:

- Modernization Alternative C3 (3 freeway lanes, 2 local lanes)
- Modernization Alternative C4 (3 freeway lanes, 3 local lanes)
- Modernization Alternative C5 (4 freeway lanes, 1 local lane)
 - All up option: part of west segment Double Deck alternative (see Section 2.2)
 - Partially down option: part of west segment Double Deck alternative (see Section 2.2)
 - All down option: dropped from consideration

A key consideration of how to arrange the traffic lanes of the Double Deck alternatives is how much local traffic (traffic getting on or off I-94 at Hawley Road, Mitchell Boulevard, or the Stadium Interchange) is removed from the through-traffic (traffic bound for destinations beyond Hawley Road, Mitchell Boulevard,

or the Stadium Interchange). The objective is to carry enough traffic on the local lanes to achieve acceptable level of service on those, as well as achieve an acceptable level of service on the freeway lanes.

The Double Deck freeway options could be constructed at elevations that range from placing the top level at an elevation similar to the existing freeway's elevation (all down) to placing the bottom level at an elevation similar to the existing freeway's elevation (all up), or a combination of the two (partially down). WisDOT and FHWA assessed the costs, constructability, and other relevant factors related to the height of the Double Deck freeway segment under consideration.

The Double Deck all up and partially down options remain under consideration. See Section 2.2.

The cost of the Double Deck all down option, burying the freeway so that the top level of the double deck is at or about the same elevation as the existing freeway, would be approximately \$415 to \$435 million (2014 dollars; all total costs cited here reflect the combination of the west segment and cemetery segment), which is about \$120 to \$140 million more than the Double Deck all up option. Additionally, I-94 would need to be completely closed to all traffic around the clock for a minimum of 6 months during reconstruction. Because there is no other east-west freeway in the vicinity (the only other east-west freeway in Milwaukee is I-894, about 5 miles south of I-94) WisDOT anticipates large amounts of diverted traffic on adjacent east-west arterials, including Wisconsin Avenue, Bluemound Road, National Avenue, Greenfield Avenue, and other more distant arterials. The user-delay cost of a minimum 6-month, full freeway closure would likely be substantial.

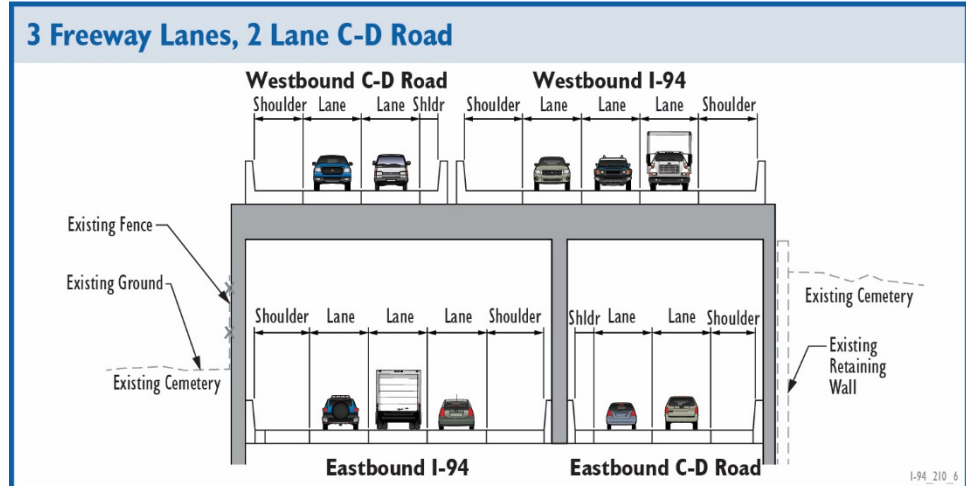
The all down option would function as a 3,000-foot-long tunnel, and therefore the National Fire Protection Association standards would come into play. FHWA requires that road tunnels comply with National Fire Protection Association fire suppression and life safety standards (FHWA 2009). On the recently reconstructed Mitchell Interchange project in Milwaukee WisDOT designed three tunnels to these nationally recognized standards. To comply with National Fire Protection Association standards, a mechanical, forced-air ventilation system would be needed, as would an emergency egress infrastructure. The system would consist of stairwells at a 1,000-foot spacing from the lower level to the surface level. The ventilation and emergency egress requirements add to the cost and depth of the tunnel, and, in the case of the stairwells, the width of the tunnel. This effect, in turn, would require compromises on shoulder width in order to accommodate the stairwells. Additionally, an underground storage tank to collect any spilled fuel or oil would be necessary. (The Double Deck all up and partially down options would not need these fire protection measures as long as the sides of the double deck structure are open, which is WisDOT's intention. Since they are aboveground, they would not need stairwells to ground level.)

Lastly, the two crossroads that currently cross under I-94 would need to be built over I-94 (they could not remain under I-94 because the bottom level of the freeway would be approximately 30 feet below ground). Hawley Road would cross over I-94, about 25 feet above the existing freeway. Mitchell Boulevard would also be reconstructed to cross over I-94, with the top of the new Mitchell Boulevard bridge about 25 feet above the existing freeway. This would require extensive reconstruction of Mitchell Boulevard in Mitchell Park north of I-94, and on the VA campus south of I-94. Both segments lie within or adjacent to the Soldiers' Home NHL boundary. So the reduced visual impact of the double deck freeway would be partially offset by the visual impact of the new bridge carrying Mitchell Boulevard over I-94.

Based on the additional cost and potential closures to I-94 during construction, the all down option was dropped from further consideration.

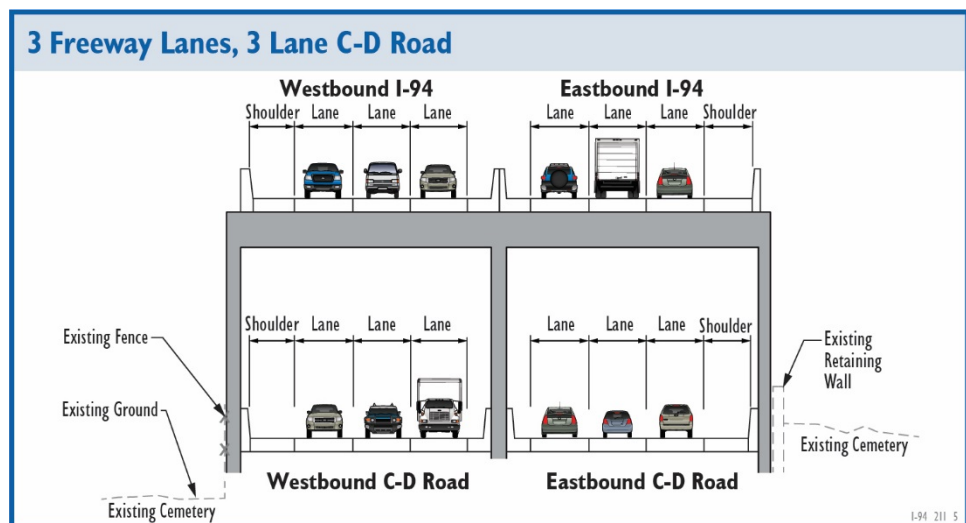
Modernization Alternative C3 (3 Freeway Lanes, 2 Local Lanes)—ELIMINATED FROM FURTHER CONSIDERATION

- Traffic operations are acceptable on both the freeway and the local lanes under only one access scenario: the ramp traffic to and from the Hawley Road, Mitchell Boulevard, and Stadium Interchanges is carried on the local lanes through this segment of the project (**Exhibit 2-21**). However, this would cause a high volume of weaving on I-94 west of the cemetery segment as the local lane traffic merges with mainline freeway traffic. As noted in Section 1.2, Purpose of this Project, one of the purposes of this project is to reduce substandard weaving distances because it is a safety issue.
- Contains the least number of lanes among the three Double Deck options.
- Eliminated from consideration because of weaving that would be caused west of the cemetery segment.



Modernization Alternative C4 (3 Freeway Lanes, 3 Local Lanes)—ELIMINATED FROM FURTHER CONSIDERATION

- Eliminated from consideration for same reasons as Alternative C3 (**Exhibit 2-22**).
- Eliminated from further consideration because it would create a weaving problem between the 70th Street ramps and the 84th Street interchange with I-94. This is because the westbound local lanes would merge with the freeway near 70th Street.



2.5.5.4 Stadium Interchange Segment Modernization Alternatives

The Stadium Interchange segment was defined as I-94 from Mitchell Boulevard to 35th Street. WisDOT evaluated the following alternatives for the Stadium Interchange:

- Modernization Alternative S1 (System Interchange—Stacked)
- Modernization Alternative S2 (System Interchange—Turbine)
- Modernization Alternative Modified S2 (System Interchange—Low-Speed, Free-Flow)
- Modernization Alternative S3 (Service Interchange—Three-Level Interchange with Free-Flow Ramps from I-94) (*Part of east segment alternatives. See Section 2.2*)

- Modernization Alternative S4 (Service Interchange—Two-level Single Point Interchange)
- Modernization Alternative S5 (Service Interchange—Modified Echelon interchange)
- Modernization Alternative S6 (Service Interchange—US 41 Diamond)
- Grade Separated Diverging Diamond Interchange

Modernization Alternative S1 (System Interchange-Stacked)—ELIMINATED FROM FURTHER CONSIDERATION

- Would reconstruct the interchange as a 4-level system interchange with right-hand entrance and exit ramps (**Exhibit 2-23**). The existing interchange is a 3-level interchange; thus, under this alternative, the interchange would be higher than it is today.
- Wisconsin Avenue/Wells Street interchange with US 41 would be removed. No access to Canal Street/Frederick Miller Way from southbound US 41/Miller Park Way or to northbound US 41/Miller Park Way from Canal Street/Frederick Miller Way.
- I-94 would operate at level of service D, and US 41 would operate at level of service C or better. The interchange ramps would also operate at level of service C or better.
- Eliminated from further consideration because of its cost, the increased footprint and proposed height of the 4-level interchange, and changes in access to US 41/Miller Park Way.

Modernization Alternative S2 (System Interchange-Turbine) and Modernization Alternative Modified S2 (System Interchange—Low-Speed, Free-Flow)—ELIMINATED FROM FURTHER CONSIDERATION

- Would reconstruct the interchange as a system interchange (**Exhibit 2-24**). I-94 would be reconstructed south of its existing alignment, and US 41/Miller Park Way would be moved east. Alignment shifts are necessary to most optimally locate the new interchange, straighten I-94, and avoid impacts to residences in neighborhoods northeast and northwest of the interchange, as well as to Miller Park.
- Full access at Canal Street/Frederick Miller Way. No access to or from I-94 and Wisconsin Avenue interchange and no access to/from US 41/Miller Park Way and 35th Street.
- I-94 would operate at level of service D, and US 41 would operate at level of service C or better. The interchange ramps would also operate at level of service C or better.
- Following the December 2012 PIM, a modified version of this alternative was developed (**Exhibit 2-25**). The modified low-speed (25 miles per hour [mph] on some ramps) free-flow system interchange would reduce the interchange's footprint (due to the fact the lower speed ramps would require less space) while continuing to satisfy the project's purpose and need. The modified alternative would continue to provide acceptable level of service (level of service D or better) on all ramps in the interchange.
- Eliminated from further consideration because it would cost more and have a larger footprint than Modified Alternative S3, and Modified Alternative S3 provides an acceptable level of service (level of service D or better).

Modernization Alternative S4 (Service Interchange—Two-level Single-Point Interchange)—ELIMINATED FROM FURTHER CONSIDERATION

- The Stadium Interchange would be reconstructed as a single-point service interchange (**Exhibit 2-26**). I-94 mainline would be shifted south while the single-

Single Point Interchange



A single point interchange is a type of service interchange where ramp entrances/exits are controlled by a single traffic signal. A single-point interchange can be more efficient than a diamond interchange because there is one signal for cross-road traffic to go through, rather than two signals at a diamond interchange.

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point interchange would be located north of I-94.

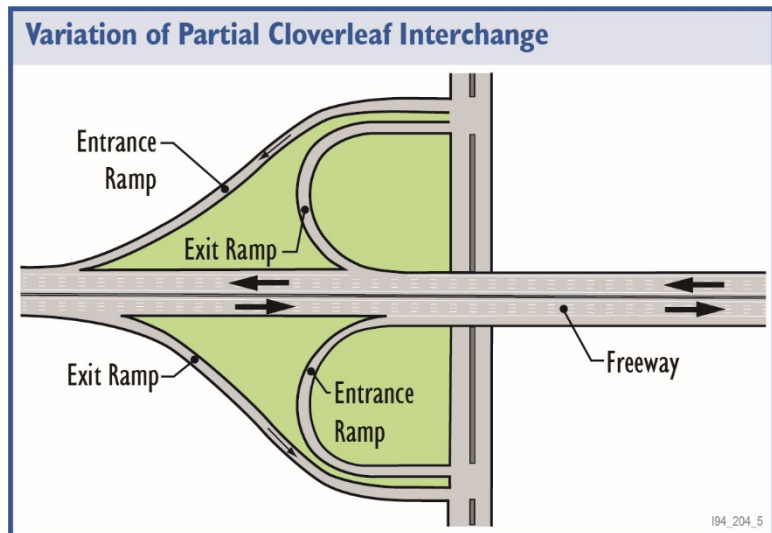
- I-94 traffic would pass on one level, US 41/Miller Park Way traffic would pass on a second level, and a signal would direct turning traffic on the same level as US 41/Miller Park Way.
- Eliminated from further consideration because the traffic signal for northbound and southbound US 41/Miller Park Way traffic in this configuration would result in a level of service F on US 41/Miller Park Way.

Modernization Alternative S5 (Service Interchange—Modified Echelon Interchange)—ELIMINATED FROM FURTHER CONSIDERATION

- The Stadium Interchange would be reconstructed with some ramps providing free-flow connection between I-94 and US 41/Miller Park Way and others ending at traffic signals along US 41/Miller Park Way (**Exhibit 2-27**). I-94 would remain close to its existing alignment, while US 41/Miller Park Way would shift east.
- Left-hand exits and entrances would remain on US 41/Miller Park Way and would require weaving.
- Eliminated from further consideration because left-side merging on US 41/Miller Park Way would restrict access to Frederick Miller Way and would not provide free-flow ramps from I-94.

Modernization Alternative S6 (Service Interchange—US 41 Diamond)—ELIMINATED FROM FURTHER CONSIDERATION

- The Stadium Interchange would be reconstructed as a diamond interchange (**Exhibit 2-28**). I-94 westbound lanes would shift south to avoid residential displacements north of the freeway.
- This option “downgrades” US 41/Miller Park Way to an arterial; signals at the I-94 ramp terminals would require north- and southbound traffic to stop at the signal, losing its free-flow travel. All ramps to/from I-94 would operate at level of service F.
- This alternative would remove the interchanges at US 41/Wisconsin Avenue and Miller Park Way/Frederick Miller Way, replacing each with at-grade intersections.
- A partial cloverleaf interchange would be provided at 44th Street to replace the access lost at the Mitchell Boulevard interchange.
- Eliminated from further consideration because the level of service on US 41/Miller Park Way does not satisfy purpose and need due to level of service F on the ramps to and from I-94.



Grade Separated Diverging Diamond Interchange—ELIMINATED FROM FURTHER CONSIDERATION

- Developed following release of the Draft EIS to account for comments made during Draft EIS availability period.
- Would be constructed as a diverging diamond (**Exhibit 2-29**). A diverging diamond interchange connects a freeway with a cross-street. The diverging diamond interchange is based on a standard diamond interchange with a shift in the cross-street traffic within the interchange that more safely and efficiently facilitates heavy left-turn movements. Within the interchange, traffic on the cross-street briefly drives on the opposite side of the road, which allows left-turns to occur without stopping or crossing oncoming

traffic. For the Stadium Interchange, the intersecting ramps and cross-street roadways would be grade separated, negating the need for any signalized intersections.

- Would provide direct access to and from the Wisconsin Avenue interchange along US 41 and I-94.
- Would eliminate the need for traffic signals on US 41/Miller Park Way through the Stadium Interchange.
- Reduced footprint compared to other Stadium Interchange alternatives.
- I-94 through the Stadium Interchange would operate at level of service D or better. US 41/Miller Park Way would generally operate at level of service C or better in the design year (2040), with the exception of northbound Miller Park Way between the Canal Street exit and entrance ramps, which would operate at level of service D during the 2040 morning peak hour.
- Eliminated from further consideration because of concern from the Milwaukee Brewers regarding the encroachment of the ramp from eastbound I-94 to US 41/Miller Park Way being closer to Miller Park and Hefner Field than under other alternatives. Additionally, the Brewers were concerned that this ramp would block the view of Miller Park from I-94 and were concerned about circulation on their internal roadways, specifically the local road network west of the Stadium Interchange.

2.5.5.5 East Segment Modernization Alternatives

The east segment is defined as I-94 from 35th Street to 16th Street. WisDOT evaluated the following alternatives for the east segment:

- Modernization Alternative E1 (Braided Ramps) (Part of east segment alternative, see Section 2.2)
- Modernization Alternative E2 (C-D Roads)
- Modernization Alternative E3 (Frontage Roads)
- Modernization Alternative E4 (No interchange at 35th Street)

An operational and safety concern in this segment is the very short weaving distance between the Stadium Interchange and the 35th Street interchange, and again between the 35th Street interchange and the 25th/26th/28th Street interchange. Additionally, providing direct access to and from 27th Street and I-94 would be beneficial because 27th Street is a main north-south arterial and a state trunk highway (WIS 57). Entrance and exit ramps that connect directly to 27th Street would likely improve local street traffic operations in and around 27th Street, and would remove some through-traffic from residential streets like 26th and 28th Streets, and improve way-finding.

For the east segment alternatives, WisDOT evaluated three potential alignments for mainline I-94, which are discussed in the following subsections.

The *On-alignment alternative* and *Off-alignment alternative* remain under consideration (see Section 2.2).

Under the *split-alignment alternative*, westbound I-94 near 30th and 20th Streets would be located on the existing I-94 alignment, while eastbound I-94 would be located up to 400 feet south of the westbound lanes. This would potentially avoid one commercial displacement near 25th Street, Badger Truck Center. The split-alignment alternative could be used as part of Alternatives E1 and E2, but, due to the configuration of the entrance and exit ramps, this alternative would not have the same advantages as it would have under Alternatives E3 and E4. This alternative has been eliminated from consideration. The business this alternative was designed to avoid did not want to be in the middle of the eastbound and westbound freeway lanes. Also, the right-of-way impacts of the eastbound lanes would not be mitigated—as it would under the Off-alignment alternative—by potential redevelopment of the existing freeway right-of-way because the westbound lanes would still occupy the existing right-of-way. Lastly, the interchange ramps at 25th/26th/28th Street could not be consolidated to 27th Street under the split alignment. Public input generally supported consolidating the ramps to 27th Street.

Cross sections for the east segment alternatives can be viewed in **Exhibit 2-30**.

East Segment Mainline Modernization Alternatives

Modernization Alternative E2 (C-D Roads)—ELIMINATED FROM FURTHER CONSIDERATION

- C-D roads would connect the 35th Street and 27th Street interchanges. The C-D roads would continue into the Stadium Interchange (**Exhibit 2-31**).
- Entrance and exit ramps would be consolidated at 27th Street.
- Eliminated from further consideration because the weaving distance on the C-D road between 35th and 27th Streets does not meet minimum AASHTO- or WisDOT-recommended length and portions of the C-D roads would operate at level of service E or F.

Modernization Alternative E3 (Frontage Roads)—ELIMINATED FROM FURTHER CONSIDERATION

- For westbound traffic, there would be an exit ramp at 25th Street and a connection to a frontage road at 28th Street that provides an entrance ramp to I-94 west of 35th Street. For eastbound traffic, there would be an exit at 35th Street with a one-way frontage road to connect 35th Street and 27th Street (**Exhibit 2-32**).
- There would be no access via I-94 to or from 35th Street or 27th Street and US 41/Miller Park Way. A driver entering I-94 at 27th Street or 35th Street would not be able to access US 41/Miller Park Way.
- The one-way frontage roads would be adjacent to I-94 and the eastbound frontage road on the south side of I-94 and the westbound frontage road on the north side. Directional signs on the freeway for both interchanges would be located prior to the exit ramps, and would guide exiting traffic to either 35th or 25th Streets.
- Ramps between 35th Street and the Stadium Interchange would be braided to avoid weaving.
- Eliminated from further consideration because the level of service at each frontage road intersection would result in lengthy delays for motorists. To provide an acceptable level of service at the intersections, the footprint of the intersections would require more right-of-way acquisition than other alternatives. Also, the level of service on I-94 would be lower because concentrating all the 27th Street and 35th Street exiting traffic at one ramp caused weaving on I-94. Similarly, the combined entering traffic from 27th and 35th Streets lowered level of service on I-94 because of weaving at the entrance ramp.

Modernization Alternative E4 (No interchange at 35th Street)—ELIMINATED FROM FURTHER CONSIDERATION

- Would reconstruct I-94 while eliminating the 35th Street interchange (**Exhibit 2-33**). Removing the 35th Street interchange provides drivers with enough distance to safely merge between the Stadium Interchange and the 27th Street interchange without braiding the ramps.
- Drivers wanting to access 35th Street would exit I-94 at US 41/Miller Park Way or 27th Street and use local roads.
- This alternative would have the narrowest footprint and lowest cost of all the east segment Modernization Alternatives.
- Eliminated from further consideration because of impacts to the local street network from traffic diverted from 35th Street and strong opposition from City of Milwaukee and local stakeholders. Also, alternatives that maintain the 35th Street interchange and meet purpose and need are available (E1 and E3).

2.5.5.6 Service Interchange Alternatives Considered and Dismissed

Remove Access at 70th Street and 68th Street

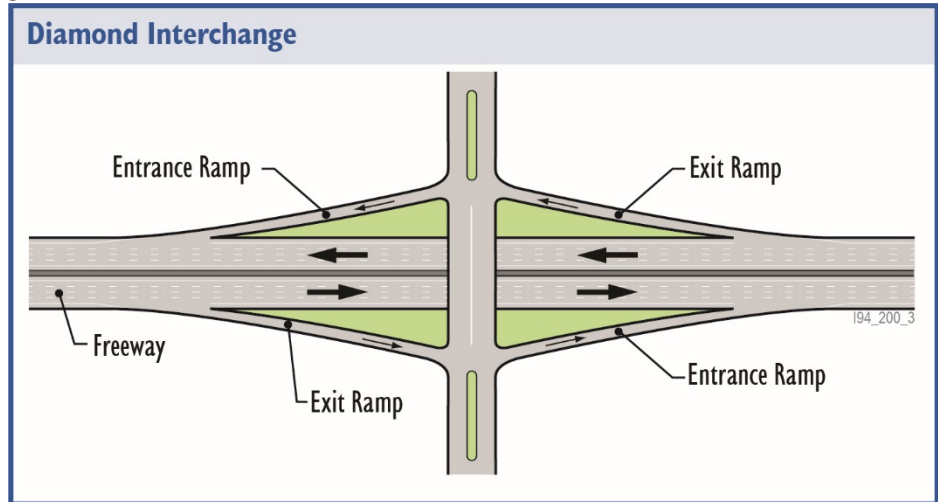
This alternative would completely remove access to and from 70th Street and 68th Street. Removing I-94 access at 70th and 68th Streets would result in less direct access to local businesses and residences. These streets are key access points to both West Allis and Wauwatosa. Based on input from the August 2012 PIMs,

all alternatives that remove freeway access at these two streets have been eliminated from consideration. The clear consensus from the public and local officials was that interchange access should remain.

As part of the addressing existing freeway deficiencies element of the project's purpose and need, AASHTO's minimum interchange spacing in an urban setting is 1 mile or more (WisDOT's is 2 miles). This minimum spacing is marginally achieved between the 68th Street/70th Street interchange and the 84th Street interchange to the west (0.9 mile), so eliminating this interchange would not address an interchange spacing issue to the west. It would address less-than-recommended spacing with the Hawley Road interchange to the east.

70th Street Diamond Interchange Alternative

The 70th Street interchange with I-94 would be reconstructed as a diamond interchange, and direct access to I-94 at 68th Street would be removed. This alternative was developed to increase the weave distance on the C-D road between 70th Street and Hawley Road. 68th Street would not pass under I-94. North of I-94, local street improvements would be required along 68th Street,



70th Street, and Stevenson Street, requiring residential displacements. This alternative could be used with Modernization Alternative W2 or W4. The City of Milwaukee and City of Wauwatosa oppose this alternative because it would make access to residences and businesses on 68th Street less direct. This alternative was eliminated from consideration because of impacts to residences on 68th Street north of I-94, reduced access to businesses on 68th Street north of I-94, concern from the City of Wauwatosa and City of Milwaukee, and because the 68th Street/70th Street split-diamond alternative operated acceptably from a traffic and safety standpoint.

Hawley Road Interchange

WisDOT assessed several alternatives for reconfiguring the Hawley Road interchange. There were no acceptable alternatives found for a full interchange at Hawley Road under the At-grade alternative due to impacts on the cemeteries and residences. For the Double Deck alternative, all alternatives that would have reconfigured the interchange were **eliminated** based on residential displacements or impacts to the Hunger Task Force. Also, the safety and traffic operation elements of the project's purpose and need can be met while keeping the Hawley Road interchange in place (under the Double Deck alternative only).

At the request of the City of Milwaukee, WisDOT **considered** a loop ramp in the southwest quadrant of the Hawley Road interchange to enter eastbound I-94. The City proposed this as a way to maintain access at Hawley Road without building a Double Deck through the cemetery segment. Under this alignment, eastbound I-94 through the cemetery segment would operate at level of service E, and an initial design of a loop ramp in the southwest quadrant suggests that an additional 30 to 50 residences would be displaced. This alternative was eliminated from further consideration because of its residential displacement impacts and because the 68th Street interchange is about 8 blocks west of the Hawley Road interchange, and the Stadium Interchange is less than 1 mile to the east.

In spring 2014 when WisDOT and FHWA considered a half interchange at Hawley Road, three options for addressing the relatively short distance between the Hawley Road ramps and the 68th Street ramps were

considered. One was braided ramps between the two interchanges. Another option was a C-D road, and a third option, shown in **Exhibit 2-2**, is an auxiliary lane. Per WisDOT and FHWA's preference, the auxiliary lane option was identified as the best connection between a Hawley Road half interchange and the 68th Street entrance/exit ramps because it would have fewer residential displacements than the braided ramps, and a lower cost, and would have better traffic operations than the C-D road.

At the request of the City of West Allis, WisDOT considered providing full access at the Hawley Road interchange under the At-grade alternative. Similar to the City of Milwaukee request, WisDOT found that the environmental and socioeconomic impacts of providing full access were too great considering that the 68th Street interchange is about 8 blocks west of the Hawley Road interchange, and the Stadium Interchange is less than 1 mile to the east. The Washington Street connection was developed in an effort to mitigate this loss in access.

35th Street Interchange

Non-braided Ramps between Stadium Interchange and 35th Street

All alternatives with non-braided ramps between the Stadium Interchange and 35th Street were dismissed. The alternatives were dismissed due to substandard weaving distance between the Stadium Interchange and 35th Street. Addressing substandard weaving distances is part of the substandard design element of the project's purpose and need.

Loop Ramp

This alternative would have used a loop ramp in the northeast quadrant as a part of the 35th Street interchange with I-94. The alternative was dismissed due to the resulting right-of-way acquisition (approximately 7 to 8 acres) and displacements (approximately 31 to 44 residential and 0 to 2 commercial).

Diverging Diamond Interchange

This alternative would reconstruct the 35th Street interchange with I-94 as a diverging diamond interchange (see divergingdiamond.com). The alternative was dismissed due to the right-of-way acquisition (approximately 1.5 acres) and displacements (approximately 3 residential and 2 commercial) that would be required by the larger footprint of a diverging diamond interchange.

Split-Diamond Alternative. The 35th Street interchange would be combined with 27th Street and 25th Street to form a split diamond interchange connected by frontage roads. This alternative was dismissed because of poor traffic operations on the frontage roads between the halves of the split diamond.

25th/26th/28th Street/St. Paul Avenue Interchange

Full Diamond at 25th Street

This alternative would include a full diamond interchange at 25th Street and eliminate direct access between 27th Street and I-94. Although 25th Street connects to the Menomonee Valley, it is not a major arterial. The alternative was dismissed due to its right-of-way acquisition (approximately 13.5 acres) and approximately 6 commercial displacements, and because it would not directly connect 27th Street to I-94.

Single-Point Interchange at 25th Street

This alternative would include a single-point interchange at 25th Street and eliminate direct access between 27th Street and I-94. Although 25th Street connects to the Menomonee Valley, it is not a major arterial. The alternative was dismissed due to the level of right-of-way acquisition (approximately 2 acres) and residential displacements (approximately 3), and because it would not directly connect 27th street to I-94.

2.5.6 Other Corridor-wide Alternatives Considered and Dismissed

The following corridor-wide alternatives were considered and dismissed during initial screening. Other alternatives for a specific segment or a specific interchange that were dismissed during the initial screening are listed in Appendix A.

2.5.6.1 Combination of Non-Capacity Expansion Alternatives

WisDOT assessed whether a combination of non-capacity expansion alternatives could, together, address the purpose and need of the project. WisDOT assessed whether a 6-lane Modernization Alternative combined with region-wide TSM and TDM measures recommended in the 2035 regional transportation plan could eliminate the need to add capacity to I-94 (Table 2-5).

TABLE 2-5
Combination of Non-Capacity Expansion Alternatives

Purpose and Need Element	TSM (listed in Section 2.5.2)	TDM (listed in Section 2.5.3)	TSM + TDM + No build	TSM + TDM+ Replace in Kind	TSM + TDM + Spot Improvements	TSM + TDM + 6-Lane Modernization
Pavement and Bridge Condition	No	No	No	Yes	Yes	Yes
Does the alternative replace deteriorated pavement?	Would not replace pavement and bridges.	Would not replace pavement and bridges.	Would not replace pavement and bridges.	Would replace pavement and bridges.	Would replace pavement and bridges.	Would replace pavement and bridges.
Safety	No	No	No	No	Partially	Partially
Does the alternative address the obsolete design of the I-94 East-West Corridor to improve safety and decrease crashes?	Would not address substandard design elements that contribute to crashes. Crash rate would likely increase as congestion increases.	Would not address substandard design elements that contribute to crashes. Crash rate would likely increase as congestion increases.	Would not address substandard design elements that contribute to crashes. Crash rate would likely increase as congestion increases.	Would not address substandard design elements that contribute to crashes. Crash rate would likely increase as congestion increases.	Would address some design deficiencies. Crash rate would improve somewhat over existing condition.	Would address substandard design elements that contribute to crashes. Crash rate would improve compared to existing condition.
Congestion	No	No	No	No	No	No
Does the alternative accommodate existing and future traffic volumes at an acceptable level of service (level of service D or better)?	Would not sufficiently accommodate existing and future traffic volumes.	Would not sufficiently accommodate existing and future traffic volumes.	Would not sufficiently accommodate existing and future traffic volumes.	Would not sufficiently accommodate existing and future traffic volumes.	May improve traffic operations in specific locations. Would not accommodate existing and future traffic volumes at an acceptable level of service.	Would not accommodate existing and future traffic volumes at an acceptable level of service (some areas would operate at level of service E or F).
System Linkage and Route Importance	No	No	No	No	No	No
Does the alternative maintain a key link in the local, state, and national transportation network?	More frequent and extensive maintenance and congestion would disrupt traffic along I-94.	More frequent and extensive maintenance and congestion would disrupt traffic along I-94.	More frequent and extensive maintenance and congestion would disrupt traffic along I-94.	Increased congestion and crashes would decrease I-94's ability to serve as a key transportation route.	Increased congestion and crashes would decrease I-94's ability to serve as a key transportation route.	Increased congestion would decrease I-94's ability to serve as a key transportation route.

WisDOT asked SEWRPC to provide a travel demand forecast for the year 2040 that assumed full implementation of all TSM and TDM measures recommended in the regional transportation plan, but no additional lanes on this segment of I-94. WisDOT assessed whether this 6-lane plus TSM, plus TDM alternative would provide level of service D in the design year. Based on WisDOT's analysis, a 6-lane Modernization Alternative would provide level of service E and F in the design year 2040. The result is consistent with SEWRPC's analysis conducted during the regional transportation planning process and serves as an independent WisDOT validation of the SEWRPC analysis.

2.5.6.2 Off-alignment Alternatives

WisDOT and FHWA considered new corridors for I-94 north and south of existing I-94. The alternatives were dismissed due to the high cost, high amount of new right-of-way, and the number of displacements they would require. SEWRPC's 2003 freeway system reconstruction plan assessed the viability of a "North Bypass" that would connect US 45 with I-43 near Good Hope Road or Brown Deer Road. The analyses concluded that this segment would have little impact on the traffic congestion on the existing freeway system and little impact on the need to address existing freeway design, safety, and congestion problems. Accordingly, this alternative was not included for further consideration under this study.

2.5.6.3 Managed Lanes

In the 1990s major investment study process, WisDOT and FHWA considered adding lanes for the exclusive use of vehicles carrying two or more passengers (HOV lanes). In some cities, single-occupant vehicles that pay a toll are allowed to use HOV lanes. The lanes are referred to as managed lanes. In fact, the term HOV lane is generally not used anymore. This reflects that HOV lanes are now rarely built without charging a toll for their use by single-occupant drivers or during peak hours. Wisconsin has a long-standing policy not to put tolls on roads and lacks the infrastructure to collect and process tolls. Setting that issue aside for purposes of this discussion, there are other issues that make managed lanes a challenge in this corridor. Managed lanes can be separated from general purpose lanes by either pavement markings or a concrete barrier. Barrier-separated lanes are safer and more effective at stopping improper use of managed lanes. For example, a high-speed vehicle in the managed lane crashing into lower speed vehicles in the general purpose lanes could increase the severity of crashes. If a low-speed vehicle in the general purpose lanes illegally pulls into the managed lanes to avoid a slowed or stopped vehicle, they could trigger a severe crash with a high-speed vehicle in the managed lanes. A barrier also allows managed lanes to continue to operate if there is a crash in the general purpose lanes, and vice versa.

A barrier between general purpose lanes and managed lanes would widen the freeway because managed lanes would need their own shoulders, in addition to the shoulders on the general purpose lanes.

Exhibit 2-34 illustrates the width of a freeway under different combinations of general purpose and managed lanes. Adding one managed lane in each direction to three general purpose lanes would add between 30 and 60 feet to the width of I-94. Converting an existing lane to a managed lane would keep the freeway from getting wider, but congestion would be much worse; this is generally not done around the country. Whenever managed lanes are constructed, they are in addition to general purpose lanes, not in place of general purpose lanes.

The increased width of I-94 with barrier-separated managed lanes would dramatically increase the number of residential displacements compared to the other build alternatives. At least 50 to 70 residential displacements (based on WisDOT's cursory impact analysis) would be required under this alternative, compared to 4 to 19 residential displacements under the other Modernization Alternatives. Further, it would be very difficult to avoid impacts to the Wood National Cemetery, part of the Soldiers' Home NHL.

Using pavement marking to separate managed lanes from general purpose lanes has the advantage of a narrower freeway, but does not offer the safety benefits of the barrier-separated managed lanes. Most managed lanes constructed around the country in the past decade have been buffer-separated due to the real estate impacts associated with barrier-separated managed lanes.

Motorists are typically allowed to enter and exit the managed lanes every few miles. At these locations, the freeway needs more width to accommodate the added lane that carries motorists into and out of the managed lanes. These managed lane exit and entrance areas are typically in advance of and following major interchanges. Additional right-of-way and displacement impacts may occur depending on where these managed entrance and exit areas would be located.

A challenge to implementing managed lanes, either buffer or barrier-separated, on this segment of I-94 is that over 60 percent of vehicles that travel I-94 between 70th and 16th Streets are entering or exiting I-94 at one of the interchanges in the corridor. Managed lanes are usually, but not always, constructed along the median or “inside lane” of the freeway. So, drivers who want to exit the freeway at one of the many service interchanges on I-94 in the study area would have to cross over two to three lanes of traffic (not possible with barrier separation) to reach an exit ramp. Drivers entering the freeway who want to use the managed lanes would also have to weave across 2 to 3 lanes of traffic. This reduces the level of service on the freeway (National Cooperative Highway Research Program [NCHRP] 2012). Weaving at the downstream end of the managed lanes also needs to be considered. As the managed lane ends and managed-lane traffic begins to merge with traffic in the general purpose lanes, weaving would take place with traffic from the managed lane potentially moving at different speeds than the general purpose lanes.

Also, adding capacity, as planned under the alternatives that remain under consideration, would result in level of service D for most of I-94 in the design year peak hour. This would remove incentive to use a managed lane because the managed lane would not reduce travel times. A single managed lane also has less capacity than a general purpose lane (no opportunity to pass a slower moving car).

Smaller-scale options to enhance bus service, like bus bypass lanes at entrance ramps, will be considered on a case-by-case basis at ramps where MCTS finds it beneficial, and the impacts of a wider entrance ramp would not be too great.

Studies on the effectiveness of HOV lanes in reducing congestion in Seattle; San Francisco; Washington, D.C.; and other locations have reached different conclusions (Kwon and Varaiya 2005). AASHTO guidance on HOV lanes suggests that they are appropriate when, among other factors, average speeds on the freeway are “less than 30 mph for a distance of about 5 miles or more” (AASHTO 1992; 2004). FHWA also cites the 30-mph threshold (*Freeway Management and Operations Handbook*, FHWA 2011). The condition does not routinely occur on the 3.5-mile corridor between 70th and 16th Streets, nor is it forecasted to occur by the design year.

SEWRPC considered barrier-separated HOV or high-occupancy toll lanes while developing the regional transportation plan and determined that the right-of-way and displacement impacts were too great. The regional transportation plan does not recommend implementing HOV and high-occupancy toll lanes due to the additional right-of-way and increased reconstruction costs compared to adding regular freeway lanes. Additionally, HOV and/or high-occupancy toll lanes cannot be addressed on a 3.5-mile corridor, and hence, it is necessary to rely on the regional transportation process. Both WisDOT and FHWA were involved in preparation of the regional transportation plan as members of the advisory committee guiding the development of the regional transportation plan.

The managed lanes alternative was eliminated from consideration because of the relatively short corridor limits with many freeway access points and the traffic characteristics of managed lanes that add weaving movements.

2.5.6.4 Adding Capacity without Widening

In some cities, drivers are allowed to drive on the inside or outside shoulder during peak hours. Another way to add capacity is using narrower lane widths and narrow shoulders to provide additional lanes without widening the freeway.

A key benefit of these measures is increased capacity (up to 30 percent) at a low cost and/or fewer impacts. It differs from managed lanes because anyone could use the shoulder, usually with lower speed limits. The key disadvantage is that the shoulder is not available for disabled vehicles, emergency vehicle access, or

snow storage. Some studies have found an increase in crash rates when the shoulder is used as a general purpose lane. Other studies have found no change in crash rates (FHWA 2006). WisDOT's crash-prediction analysis completed for this study predicted a 60 percent increase in crashes with narrow lanes and no shoulders compared to full lanes and full shoulders. Allowing drivers to use the shoulder during peak hours or having narrow lanes and narrow shoulders was dismissed from further consideration as a corridor-wide alternative because it would not meet the safety elements of the project's purpose and need. Narrow lanes and shoulders compromise safety to too great of an extent to be a reasonable corridor-wide alternative. However, narrow lanes and shoulders are being investigated as a design option in the 2,000-foot area between the cemeteries as a way to add capacity while reducing impacts to the cemeteries.

2.5.6.5 I-94 Tunnel through Cemetery Segment

I-94 would be reconstructed underground in a tunnel. This alternative differs from the "all down" option. I-94 would be carried by the tunnel, while C-D roads would be constructed at-grade along I-94's existing alignment. It is estimated that the construction of a tunnel through the cemetery segment of the project could cost \$460 to \$530 million or more for just the 3,000 feet between Hawley Road and Mitchell Boulevard (the cost for the "all down" alternative includes the area from 70th Street to Yount Drive). Complete freeway closure for a minimum of 6 months would be required. Because of the additional costs associated with constructing a tunnel and traffic interruption during construction, this alternative has been dismissed.

2.5.6.6 Reversible Lanes

Additional lanes that could function for both eastbound and westbound traffic, depending on when extra capacity is needed, would offer little benefit to the study area as both directions experience similar traffic volumes during peak traffic hours. According to AASHTO, reversible lanes are justified when 65 percent or more of the traffic moves in one direction during peak hours (AASHTO 2001). Through the I-94 East-West Corridor, the directional split is close to 50/50 in both the morning and afternoon peak hours. The option was eliminated from consideration due to not satisfying the project's purpose and need element of accommodating future traffic volumes at an acceptable level of service.

2.6 Public and Agency Input prior to Draft EIS

After PIMs (August and December 2012, May and July 2013, and June 2014), TAC meetings (August and December 2012, March, May, and July 2013, and June 2014), and CAC meetings (August and December 2012, March, May, and July 2013, and June 2014), WisDOT and FHWA eliminated many alternatives from consideration and refined other alternatives based on traffic operations, impacts, and public input.

On May 30, 2013, WisDOT contacted Cooperating and Participating Agencies to obtain input and concurrence on the draft alternatives section of the EIS (concurrence point No. 2 per the Coordination Plan). WisDOT received responses from the National Park Service, U.S. Environmental Protection Agency (USEPA), Corps of Engineers, VA, Wisconsin Department of Natural Resources (WDNR), SEWRPC, City of Milwaukee, and City of West Allis (Appendix D).

The National Park Service was concerned about the impacts on the Soldiers' Home NHL and reiterated federal laws that apply to preservation of historic resources, specifically Section 110(f) of the National Historic Preservation Act of 1966, as amended, and noted that Section 110(f) requires federal agencies and federally funded projects "to the maximum extent possible undertake such planning and actions as may be necessary to minimize harm" to an NHL.

The VA was concerned about maintaining access to its property from the north, and stated that it would like that access to be separate from Mitchell Boulevard. The VA also asked for further coordination regarding visual and noise impacts along I-94 and potential measures to minimize impacts and coordination regarding the historic lands on its property.

The Corps of Engineers asked for clarification and further information on TSM and TDM aspects and how the broad alternatives dropped do not meet purpose and need. SEWRPC clarified the summary of its regional transportation plan and the regional planning process.

The City of West Allis passed a resolution opposing alternatives that close the interchanges at Hawley Road and 70th Street and opposed any alternatives that created more traffic on West Allis streets or involved widening West Allis streets. The City of Milwaukee encouraged consideration of a mass transit option, supported retaining the 35th Street interchange, and keeping the Stadium Interchange as far away as possible from the Story Hill neighborhood. The City of Milwaukee expressed concerns about the traffic data and using level of service as the single performance measure for congestion and deciding on the level of improvements.

At the July 2013 PIMs, WisDOT presented its one remaining alternative for the west, stadium, and east segments and the two remaining cemetery segment alternatives (At-grade and Double Deck). The potential loss of access at Hawley Road and the Double Deck alternative were two design aspects that generated concern among attendees. The need to add capacity to I-94 was also debated among many attendees.

Based on input from the City of Milwaukee after the July 2013 PIMs, WisDOT reconsidered the On-alignment alternative in the east segment. Therefore, the Draft EIS considered two alternatives in the east segment: On-alignment and Off-alignment.

On January 29, 2014, WisDOT and FHWA met with the agencies to review the project to date, provide an updated schedule, and review changes to the alternatives since the agencies last reviewed Section 2. The agencies were also provided a matrix showing the comments they previously submitted regarding Section 2 and discussion took place as to how those comments were addressed. The meeting was attended by representatives from USEPA, VA, Corps of Engineers, WDNR, SEWRPC, Milwaukee County, City of Milwaukee, and City of West Allis.

The City of West Allis reiterated their concern about the removal of the Hawley Road interchange and stated that they did not think traffic along I-94 would increase at the rate projected in the study. Milwaukee County asked how the Stadium Interchange would operate during Milwaukee Brewers' day games. The VA asked for a meeting to discuss how its previous Section 2 comments were addressed.

On June 5, 2014, WisDOT and FHWA met separately with the CAC, the TAC, and local and state elected officials that represent the study area. The project team reviewed new alternatives, namely the half interchange at Hawley Road and the On-alignment alternative on the east segment. CAC members asked if the Draft EIS would document the economic impact of closing the Hawley Road interchange. A committee member also asked for an exhibit showing the height of the Double Deck alternative adjacent to the Bluemound Heights neighborhood west of Hawley Road.

TAC members offered suggestions for providing a full interchange at Hawley Road under the At-grade alternative. The study team had already considered the suggested alternatives and dismissed them either because of their impacts or safety concerns.

During the elected officials meeting, three City of Milwaukee aldermen were critical of the decision to eliminate the 6-lane Modernization Alternatives from consideration. Loss of access at Hawley Road was also a concern among elected officials. Some of the elected officials asked that a third party review SEWRPC's traffic forecasting methodology. They think the SEWRPC forecasts overestimate future traffic volumes. For detailed information regarding the specific inputs that are part of SEWRPC's regional travel demand model, please see Chapter VI of SEWRPC's 2035 regional transportation plan. Section 6 of this Final EIS also addresses the issue.

On June 11, 2014, WisDOT and FHWA met with the Cooperating and Participating Agencies to provide an update on the remaining alternatives, project schedule, and stormwater impacts and potential mitigation measures. The meeting was attended by representatives of USEPA, Corps of Engineers, VA, Milwaukee

County, and City of West Allis. The City of West Allis reiterated the preference to maintain a full interchange at Hawley Road and suggested options for providing a full interchange at Hawley Road under the At-grade alternative. The agencies received an updated alternatives section (Section 2) on June 17, 2014, and were asked to provide formal concurrence (Concurrence Point No. 2).

2.7 Public and Agency Input during Draft EIS Availability Period

Public hearings for the project were conducted on December 3 and 4, 2014. The public, local officials, and government agencies were encouraged to provide comments regarding the project. The Draft EIS Availability period was open until January 27, 2015. This extended 74-day availability period exceeded federal requirements. Comments submitted regarding alternatives during the Draft EIS availability period are summarized in the following paragraphs and in Section 6 of this document. Additional alternatives submitted to WisDOT are also discussed in Section 6.

During the availability period, WisDOT received numerous comments from Cooperating and Participating government agencies, local officials, interest groups, and the public regarding the alternatives. Comments varied, and there was support for all alternatives. The following were the most commonly heard comments regarding alternatives:

- Support of the At-grade alternative (for various reasons, but cultural resource groups support this alternative because it would have No Adverse Effect on historic properties, specifically the Soldiers' Home NHL and Historic District, as opposed to the Double Deck alternative).
- Maintain existing interchanges.
- Support of a transit-focused alternative.
- Supporters of the Hunger Task Force were against the Double Deck alternative but desired full access at the Hawley Road interchange.
- Those with connections to the Beth Hamedrosh Hagodel Cemetery supported WisDOT for developing alternatives that did not impact the cemetery land or graves.
- Story Hill residents are generally against the Double Deck alternative.

At the Public Hearing, the City of West Allis voiced support for the Double Deck alternative because it was the only alternative that maintained full access at Hawley Road. On December 9, 2014, the City of West Allis passed a resolution in support of the Double Deck alternative if the At-grade alternative cannot accommodate full access at the Hawley Road interchange (Appendix E; E-21).

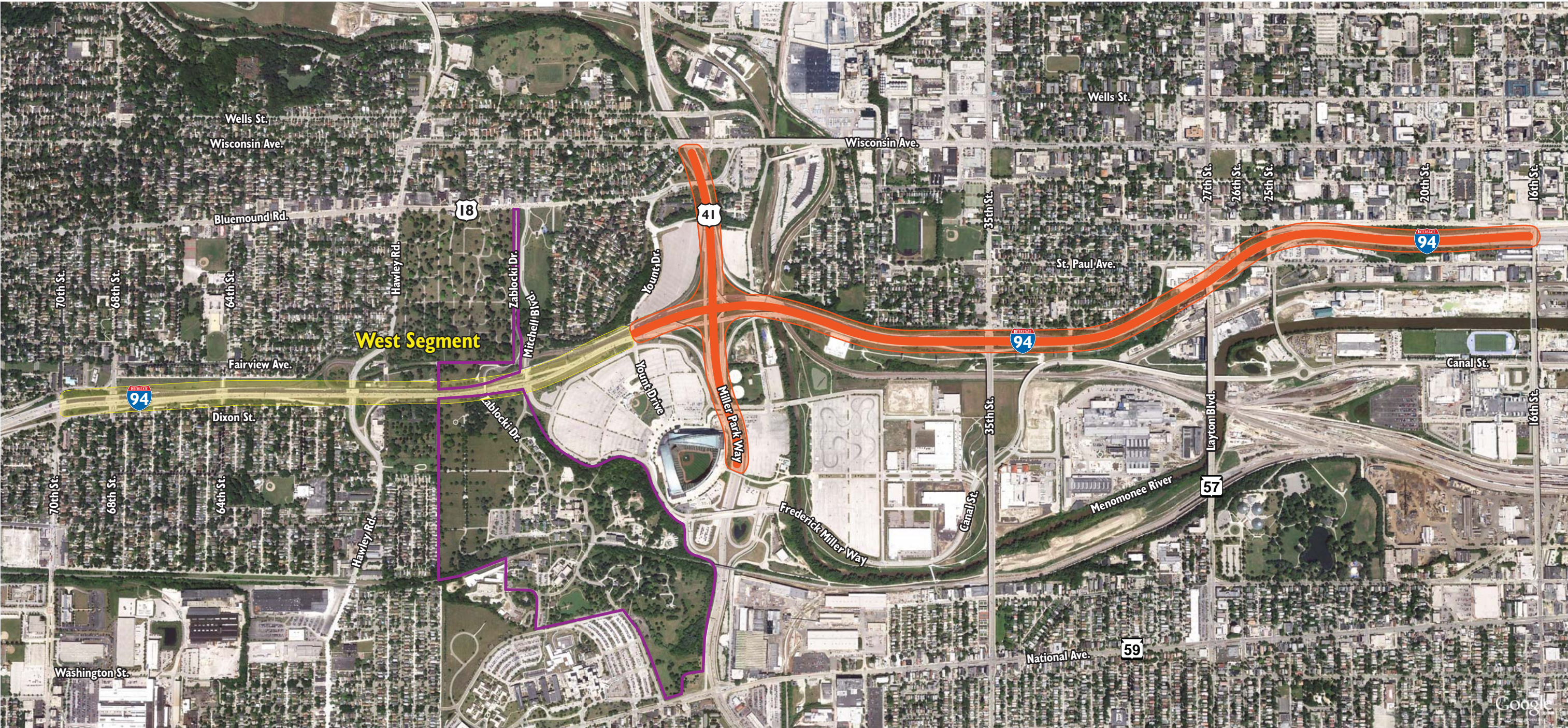
On January 5, 2015, the Village of West Milwaukee passed a resolution supporting the Double Deck alternative if the At-grade alternative cannot accommodate full access at the Hawley Road interchange (Appendix E; E-22). In addition, the village opposed any alternative that creates additional traffic on village roads and does not provide adequate future capacity on I-94.

At the Public Hearing, the City of Milwaukee (Mayor) provided public testimony in support of the At-grade alternative.

The National Park Service recommended that the At-grade alternative be identified as the preferred alternative because it would have no adverse effect on the surrounding historic properties and would cost less than the Double Deck alternative (Appendix E; E-3).

2.8 Agency Concurrence with Identified Preferred

The Army Corps of Engineers (Appendix E; E-2), USEPA (Appendix E; E-11), and WDNR (Appendix E; E-16) concurred with the identified preferred alternative.



LEGEND

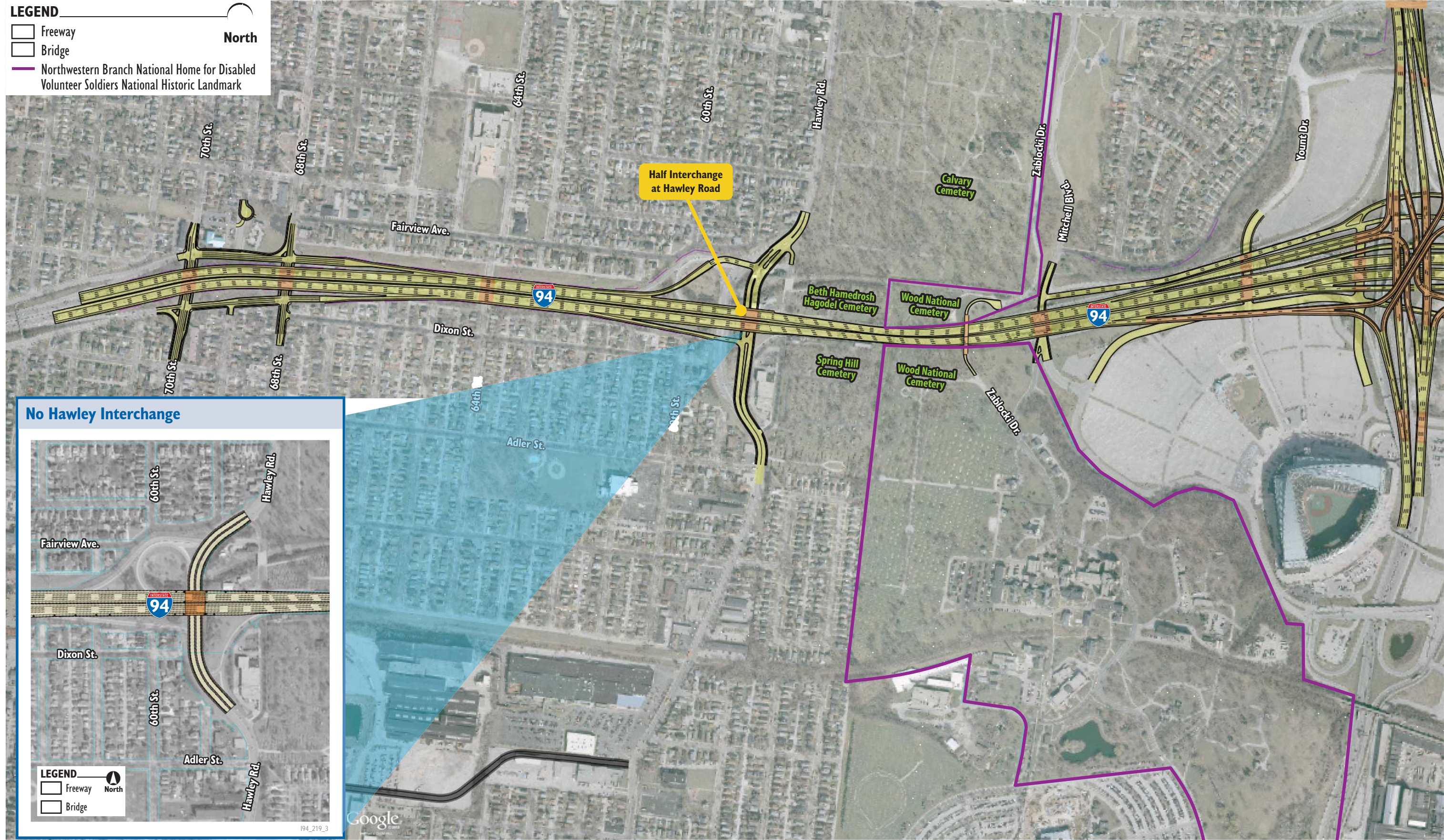
- West Segment
- East Segment
- Northwestern Branch National Home for Disabled Volunteer Soldiers National Historic Landmark

North

LEGEND

- Freeway
- Bridge
- Northwestern Branch National Home for Disabled Volunteer Soldiers National Historic Landmark

North

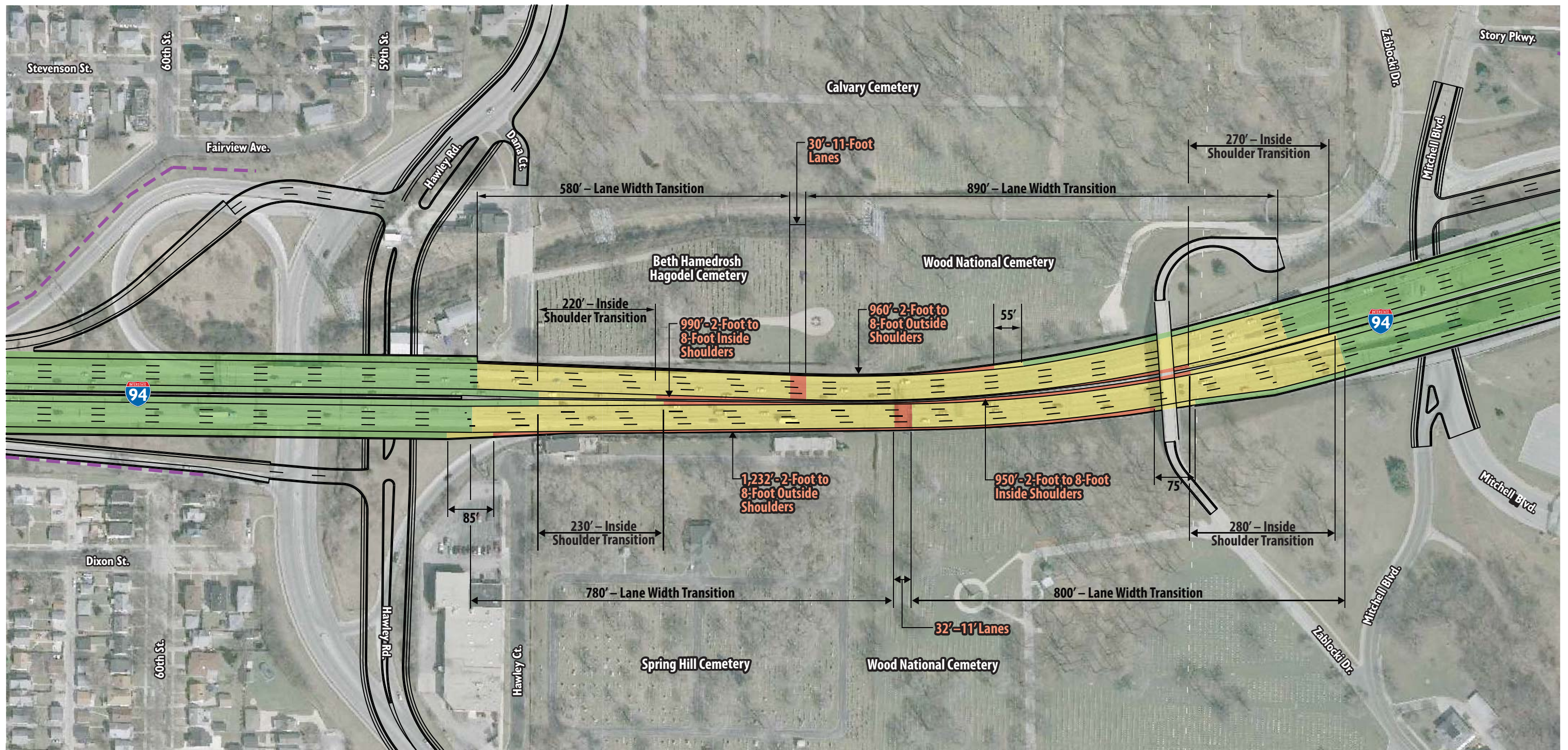


No Hawley Interchange



Preferred Alternative (with half interchange at Hawley Road)

Exhibit 2-2
West Segment At-Grade Alternative

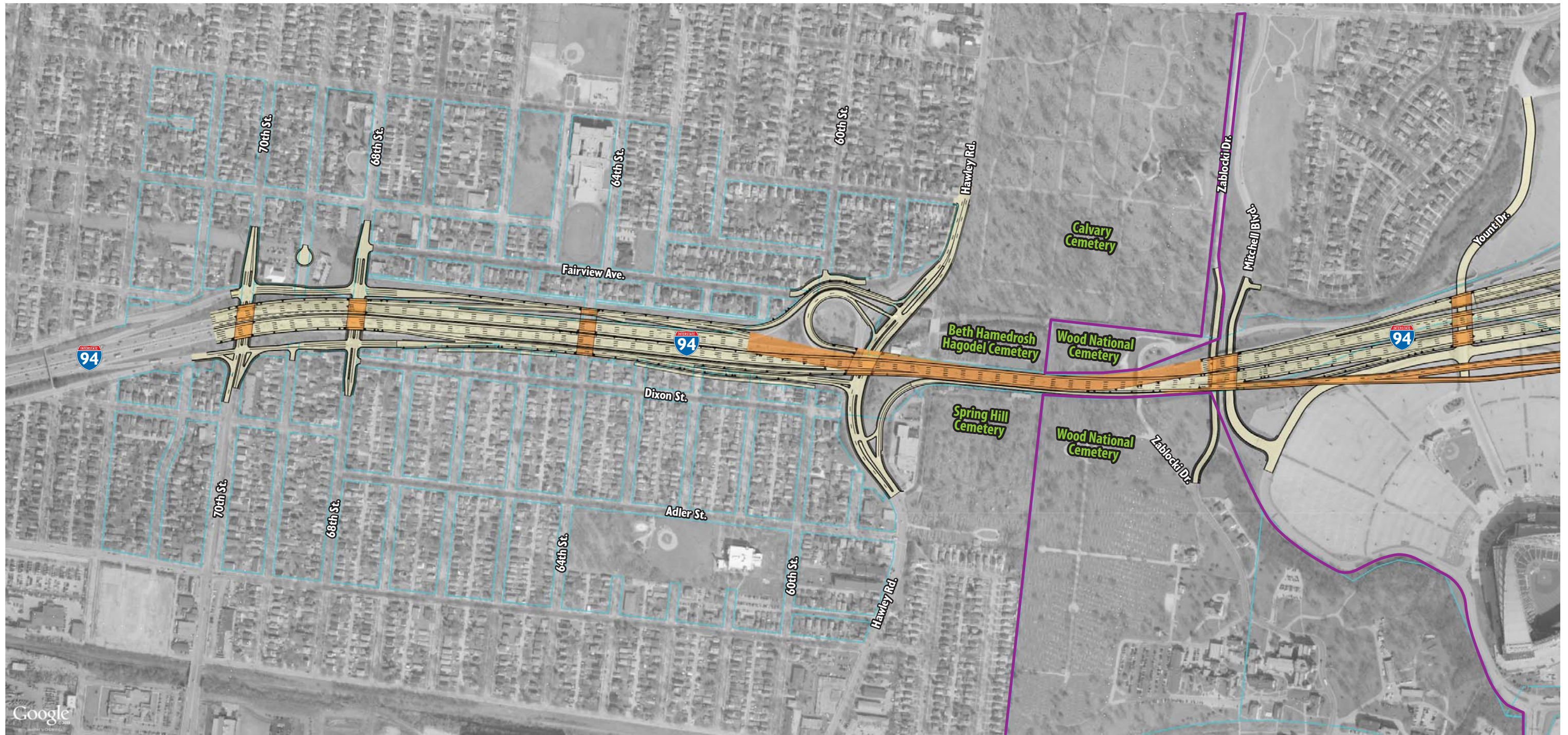


LEGEND

- ☐ Lane and Shoulder Widths Meet Standards
12' Lanes and 12' Shoulders
- ☐ Lane and Shoulder Widths Transition
Lane Widths Transition between 12' and 11'
Shoulder Widths Transition between 12' and 8'
- ☐ Minimum Land and Less than 8' Shoulder
-Refuge Widths
11' Lanes Widths 2' - 8' Shoulder Widths



U.S. Department of Transportation
Federal Highway
Administration

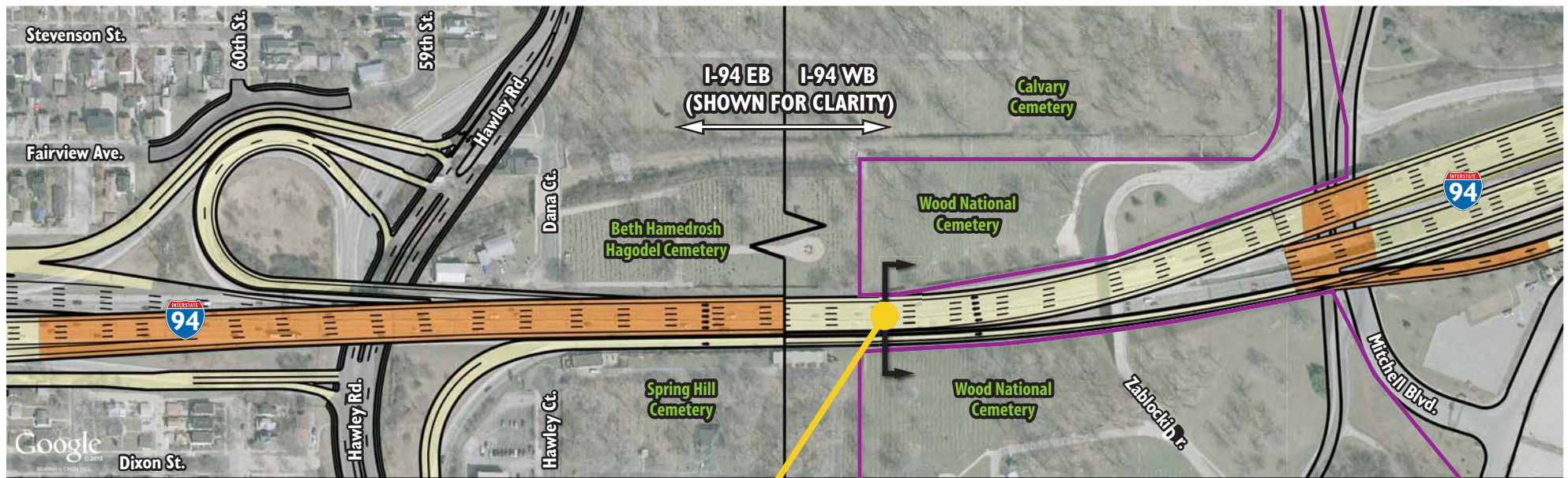


LEGEND

Freeway

Northwestern Branch National Home for Disabled
Bridge Volunteer Soldiers National Historic Landmark

North

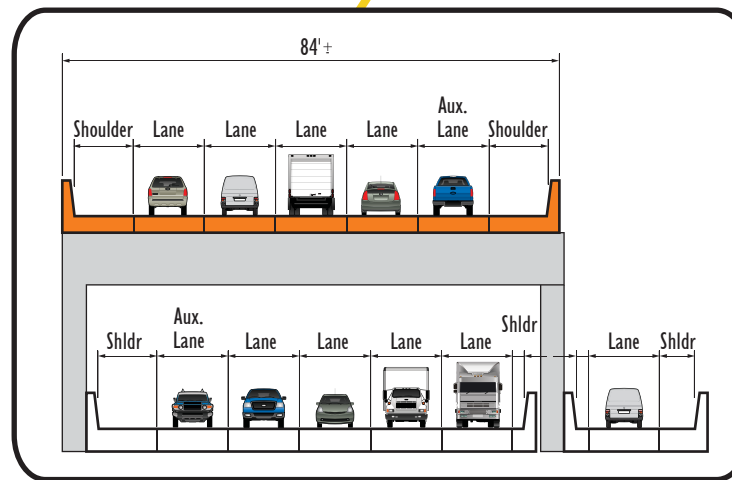


LEGEND

- Freeway
- Bridge
- Local Road

Northwestern Branch National Home for Disabled Volunteer Soldiers National Landmark

Historic





Preferred Alternative

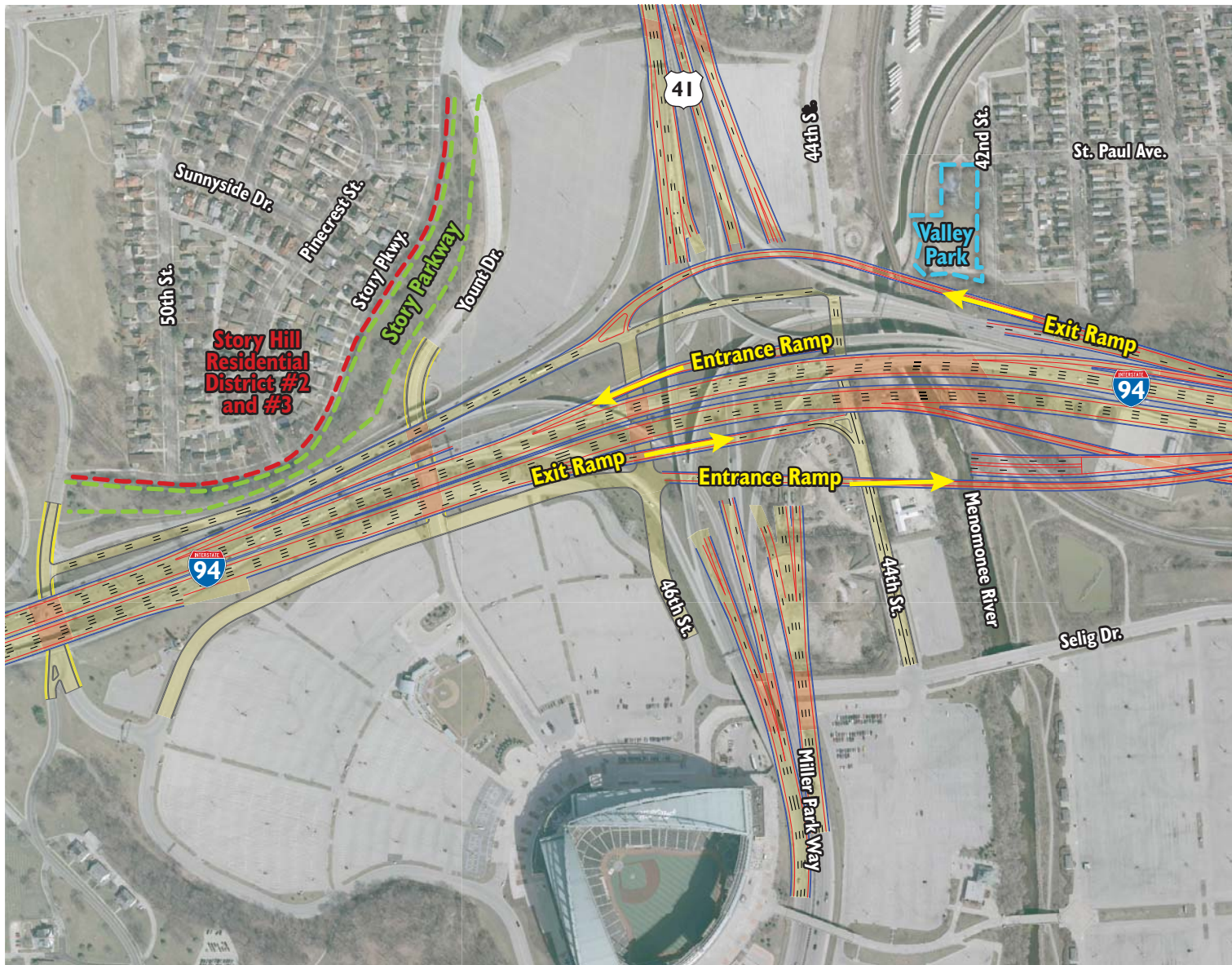
LEGEND

reeway

Bridge

North





LEGEND

reeway



Bridge



North

NOTE:
US 41 and system interchange ramps have been removed from exhibit for clarity.

Preferred Alternative





LEGEND

Freeway

Existing I-94 Alignment

Bridge

North



LEGEND

- Freeway
- Bridge
- Northwestern Branch National Home for Disabled Volunteer Soldiers National Historic Landmark

North





Exhibit 2-1 I

Off-Interstate Improvements for Preferred Alternative – Greenfield Avenue and 70th Street Intersection





Exhibit 2-13

Off-Interstate Improvements for Preferred Alternative Overview – National Avenue and Miller Park Way

Alternative		Initial Range of Alternatives	Shown at PIM #2 (Dec. 2012)	Shown at PIM #3 (May 2013)	Shown at PIM #4 (July 2013), PIM #5 (June 2014), and Public Hearings (Dec 2014)	Preferred Alternative Identified (February, 2015)	Shown on Exhibits
No-Build		Not reasonable alternative but evaluated as a baseline for comparison to the Build Alternatives					
Replace-in-Kind							
Spot Improvements							2-15
Modernization							
West Segment	West						
	W1 (Braided Ramps)						2-18
	W2 (C-D Roads)						2-2
	W3 (One-Way Frontage Roads)						2-19
	W4 (Adjacent 2-Way Arterial)						2-20
	Cemetery						
	C1 (At-grade; 4 lanes, full width shoulder)						
	C2 (At-grade; 4 Narrow Lanes, Narrow Shoulder)						2-2
	C3 (Double Deck; 3 Freeway Lanes, 2 Local Lanes)						2-21
	C4 (Double Deck; 3 Freeway Lanes, 3 Local Lanes)						2-22
	C5 (Double Deck; 4 Freeway Lanes, 1 Local Lanes)						2-4
	3 At-grade Lanes with Full Shoulders						
	5 At-grade Lanes						
	5-Lanes Double Deck with Full Shoulders						
	Tunnel with C-D Roads						
	Stadium Interchange						
	S1 (System Interchange - Stacked)						2-23
	S2 (System Interchange - Turbine)						2-24
	Modified S2 (System Interchange - Low Speed Free Flow)						2-25
	S3 (Single Point Interchange with Free Flow ramps from I-94)						2-6
East Segment	S4 (Service Interchange - 2-Level Single Point Urban Interchange)						2-26
	S5 (Service Interchange - Modified Echelon Interchange)						2-27
	S6 (Service Interchange - US 41 Diamond)						2-28
	East						
	E1 (Braided Ramps)						2-6
	E2 (C-D Roads)						2-31
	E3 (Frontage Roads)						2-32
	E4 (No Interchange at 35th Street)						2-33

See Table 2-1 for additional information on more recent screening

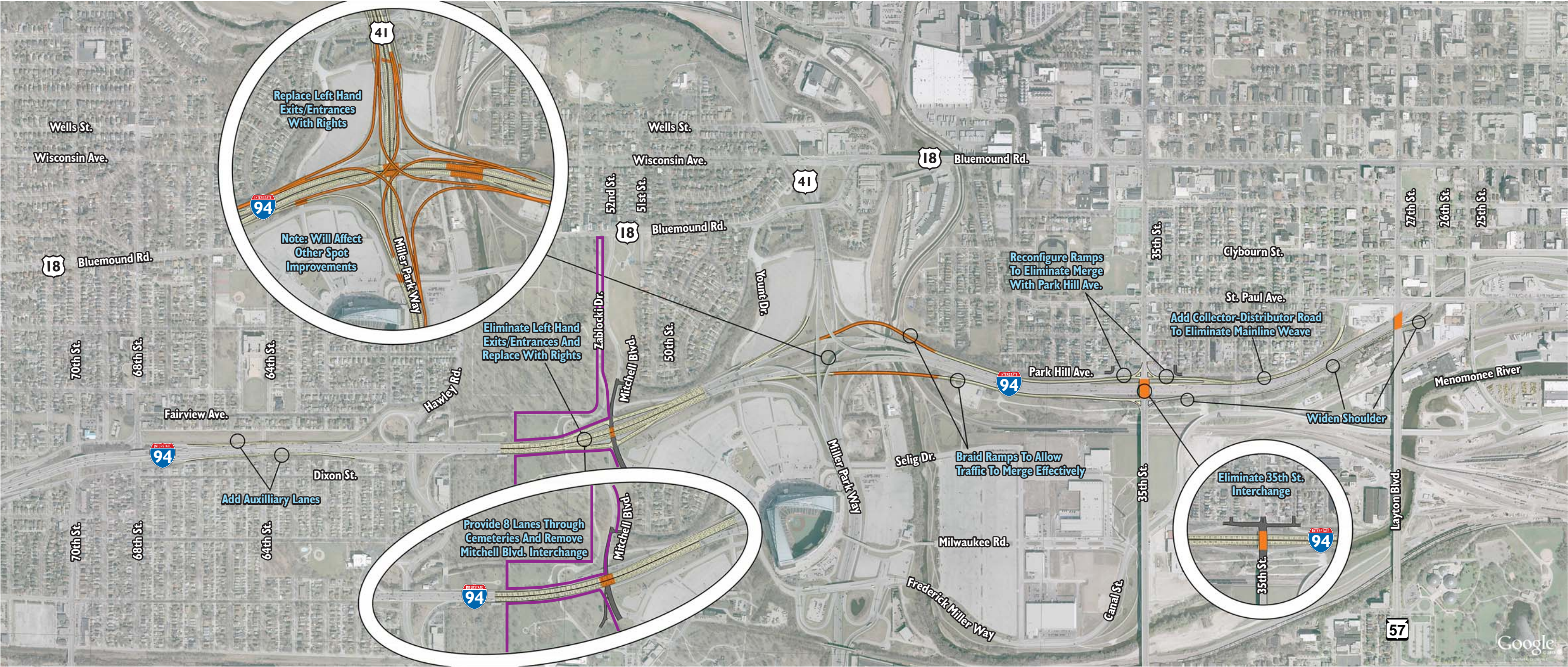
- Alternative Retained for Detailed Evaluation
- Alternative Not Carried Forward

NOTE: TSM & TDM elements as a stand-alone alternative would not address purpose and need. However, TSM & TDM elements are included as part of the Modernization Alternatives.



Exhibit 2-14

Build Alternatives Screening Results



LEGEND

- reeway
- Bridge
- Local Road
- Northwestern Branch National Home for Disabled Volunteer Soldiers National Historic Landmark

North

Alternative eliminated from further consideration

LEGEND

AM

PM

AM Peak Hour LOS E/F

PM Peak Hour LOS E/F

▲

Not to Scale

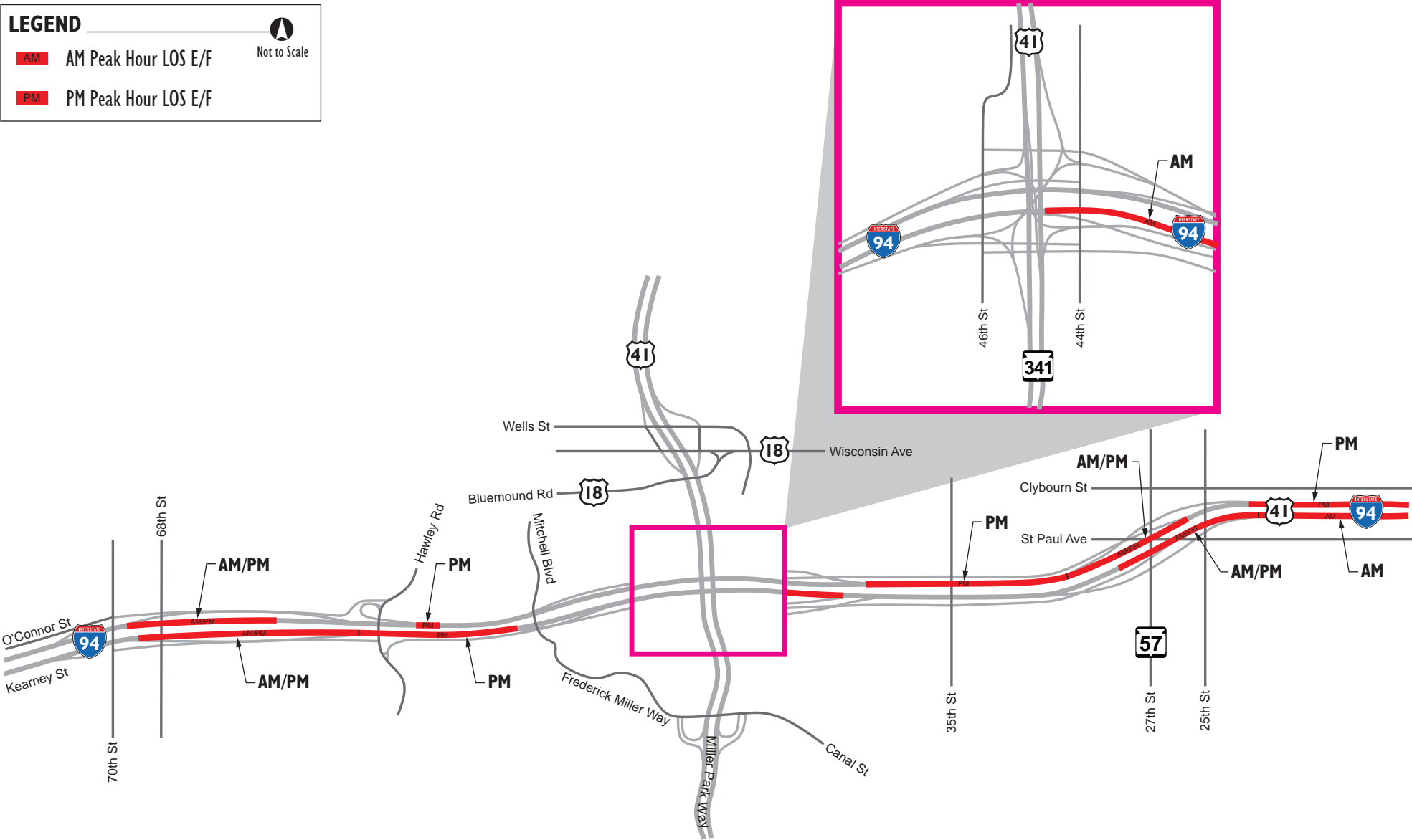
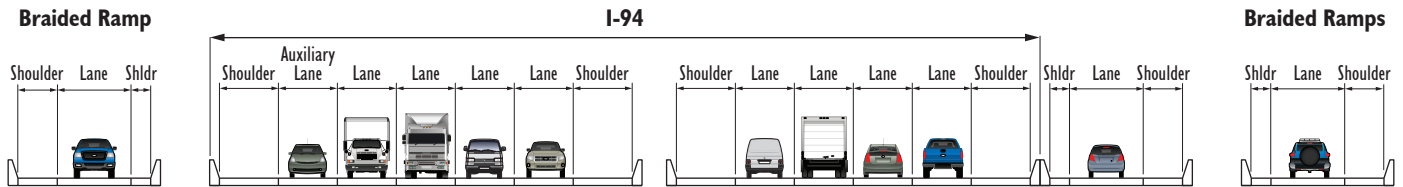
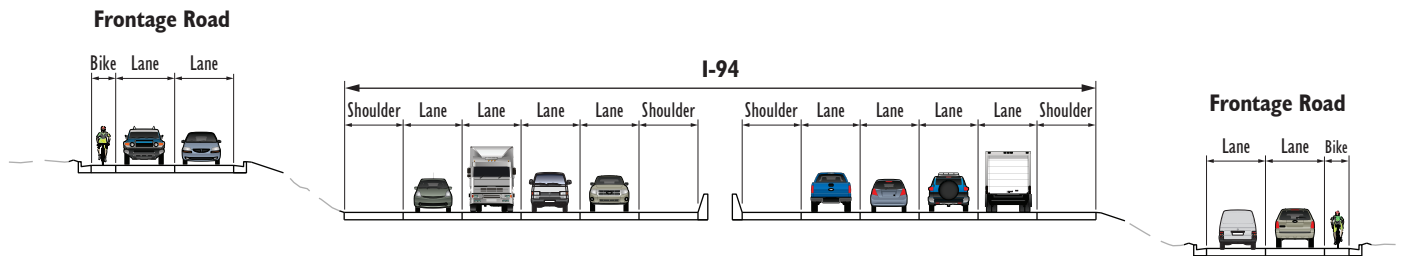


Exhibit 2-16

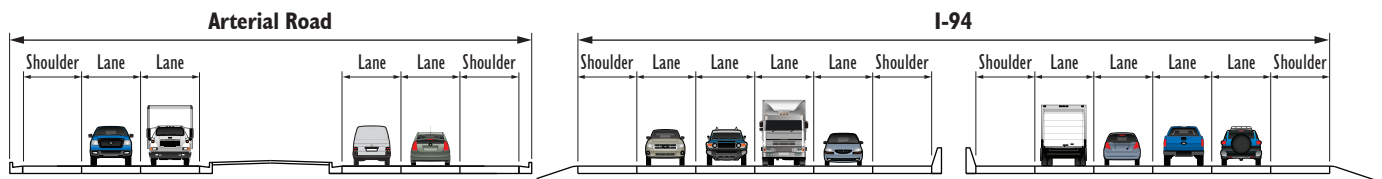
2040 6-lane Modernization Alternative Traffic Operations – Locations with Level of Service E or F



West Leg Modernization Alternative W1

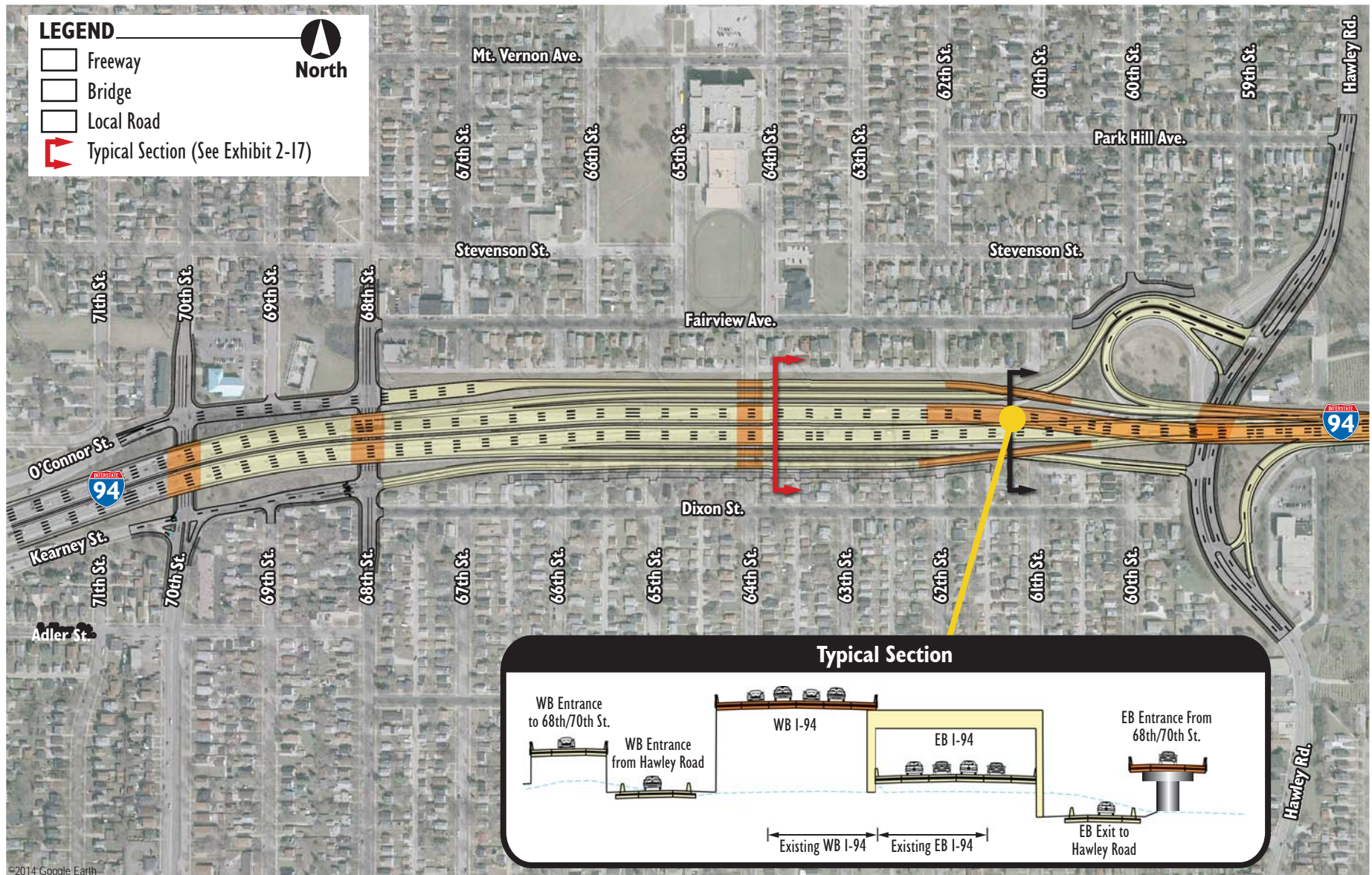


West Leg Modernization Alternative W3



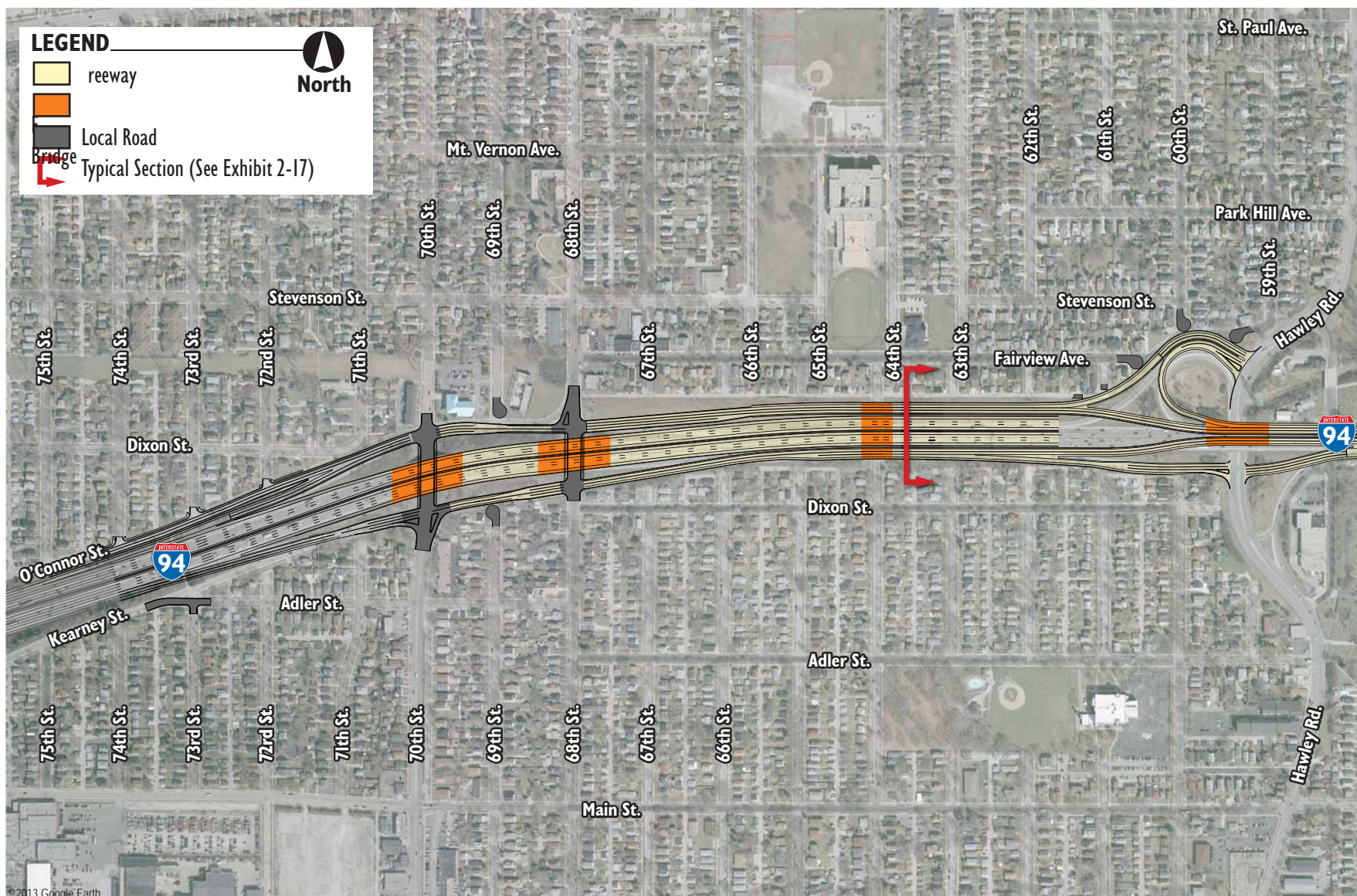
West Leg Modernization Alternative W4





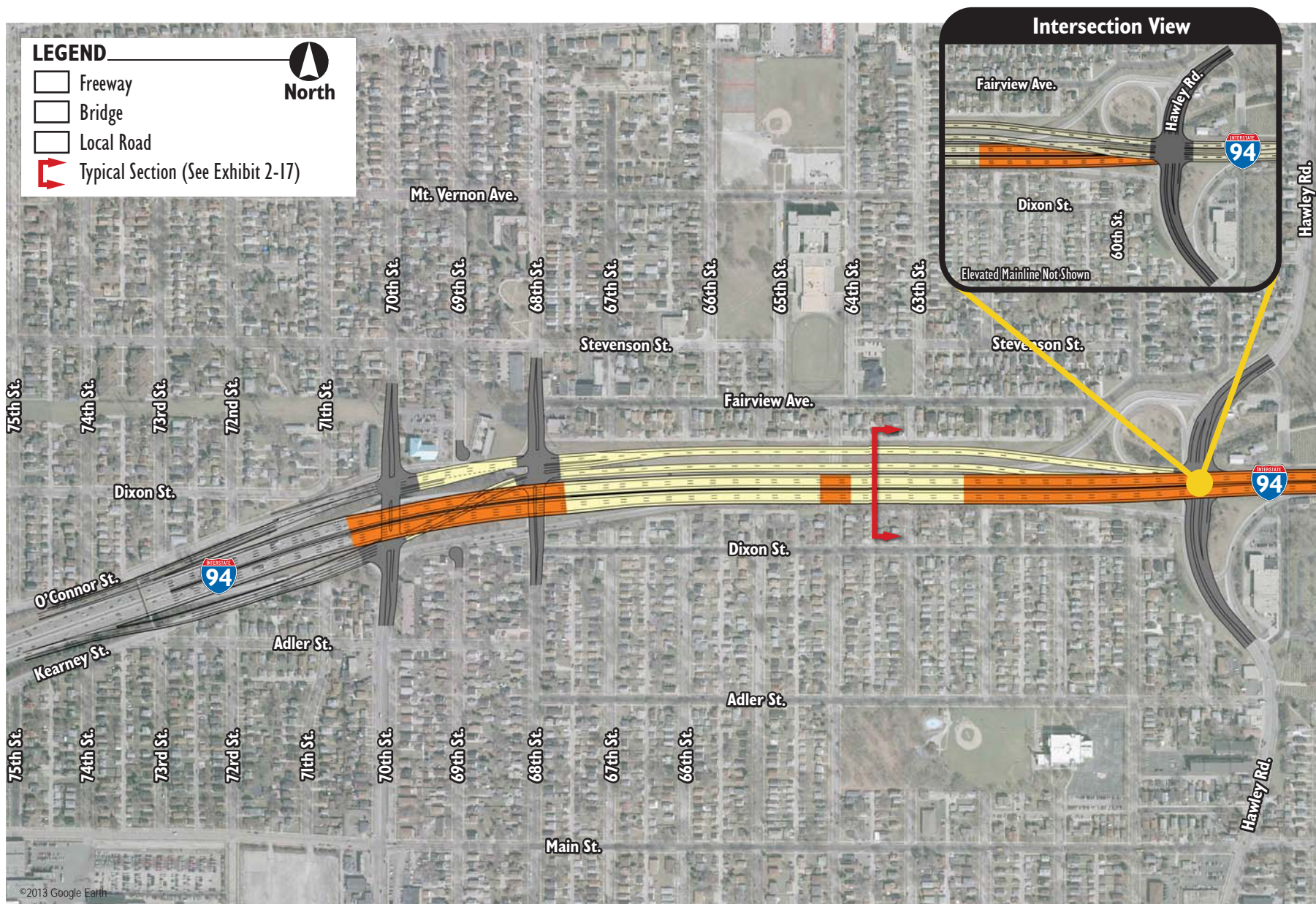
Alternative eliminated from further consideration





Alternative eliminated from further consideration





Alternative eliminated from further consideration

Exhibit 2-20

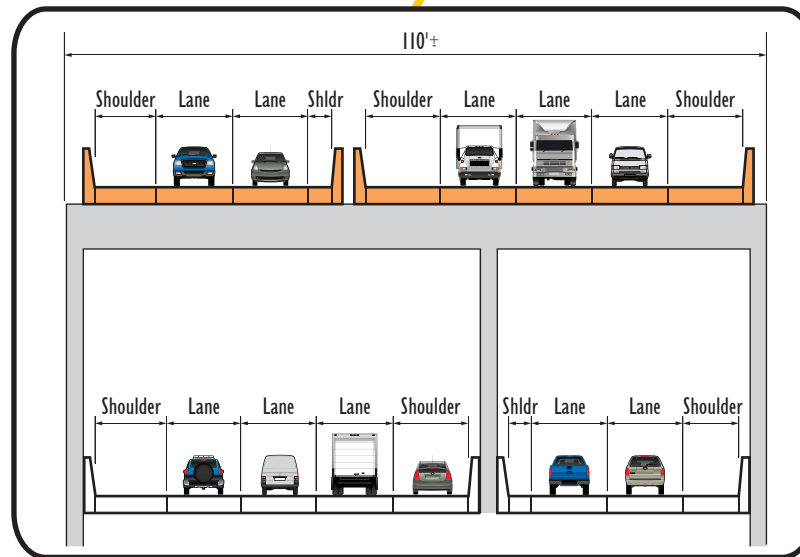
West Segment Modernization Alternative W4
(Adjacent 2-Way Arterial)





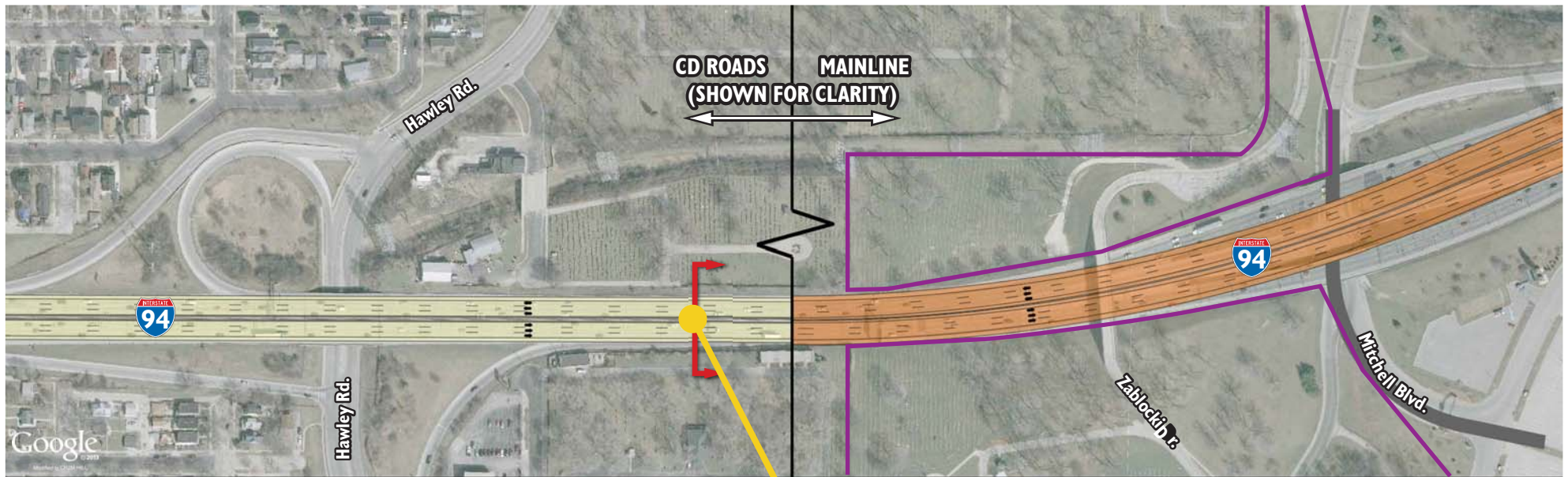
- LEGEND**
- Freeway
 - Bridge
 - Local Road
 - Northwestern Branch National Home for Disabled Volunteer Soldiers National Landmark

NOTE: A Hawley Road interchange would be included as part of this alternative.



Alternative eliminated from further consideration



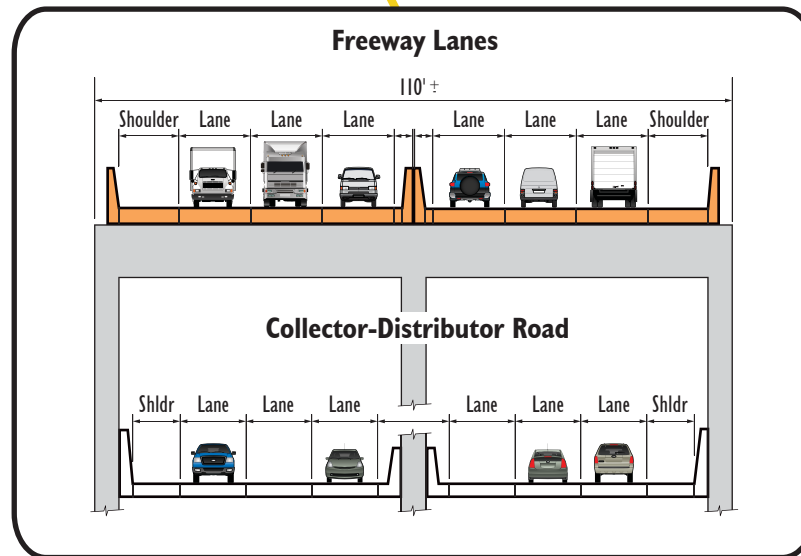


LEGEND

- Freeway
- Bridge
- Local Road

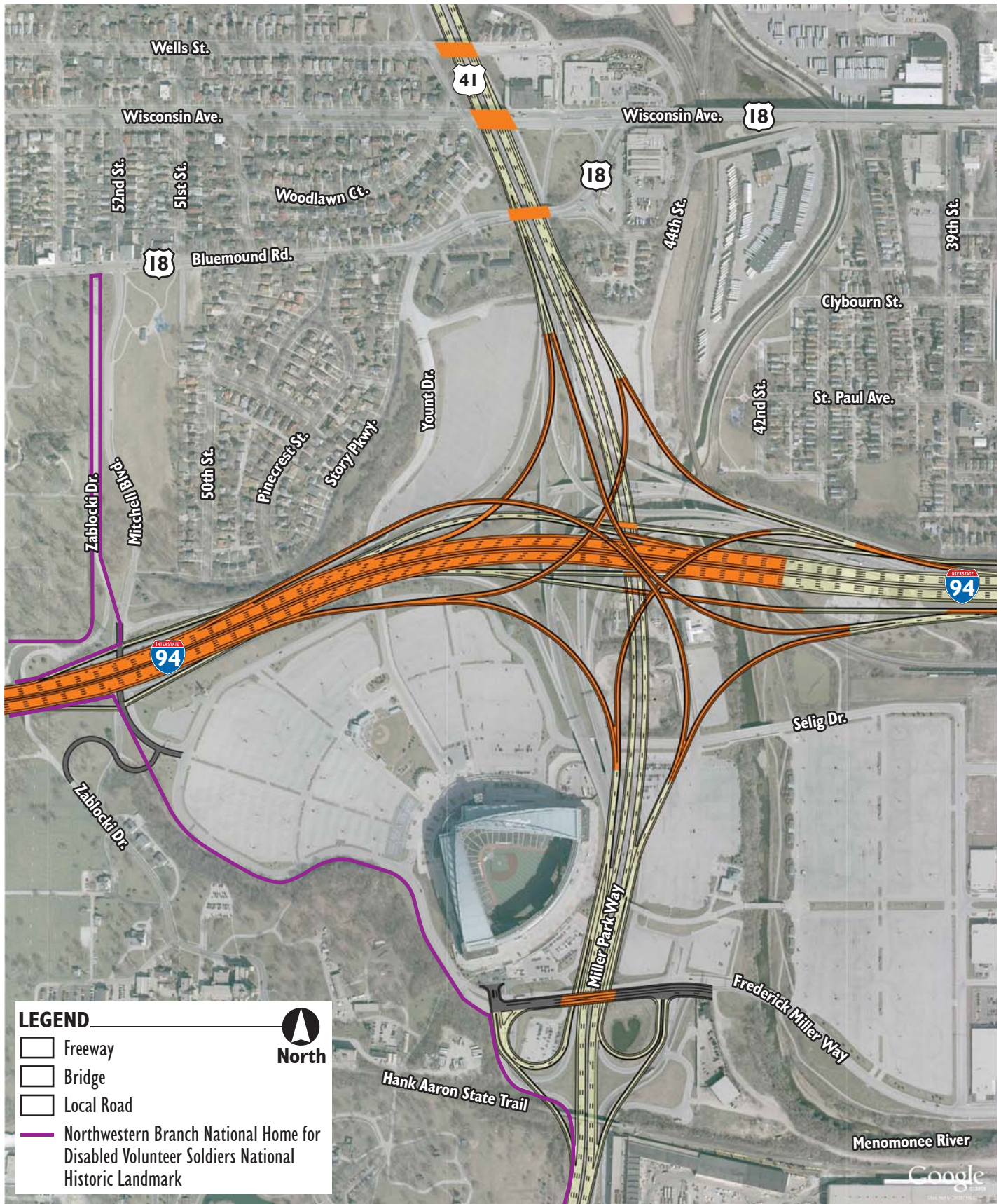
Northwestern Branch National Home for Disabled Volunteer Soldiers National Landmark

NOTE: A Hawley Road interchange would be included as part of this alternative.



Alternative eliminated from further consideration



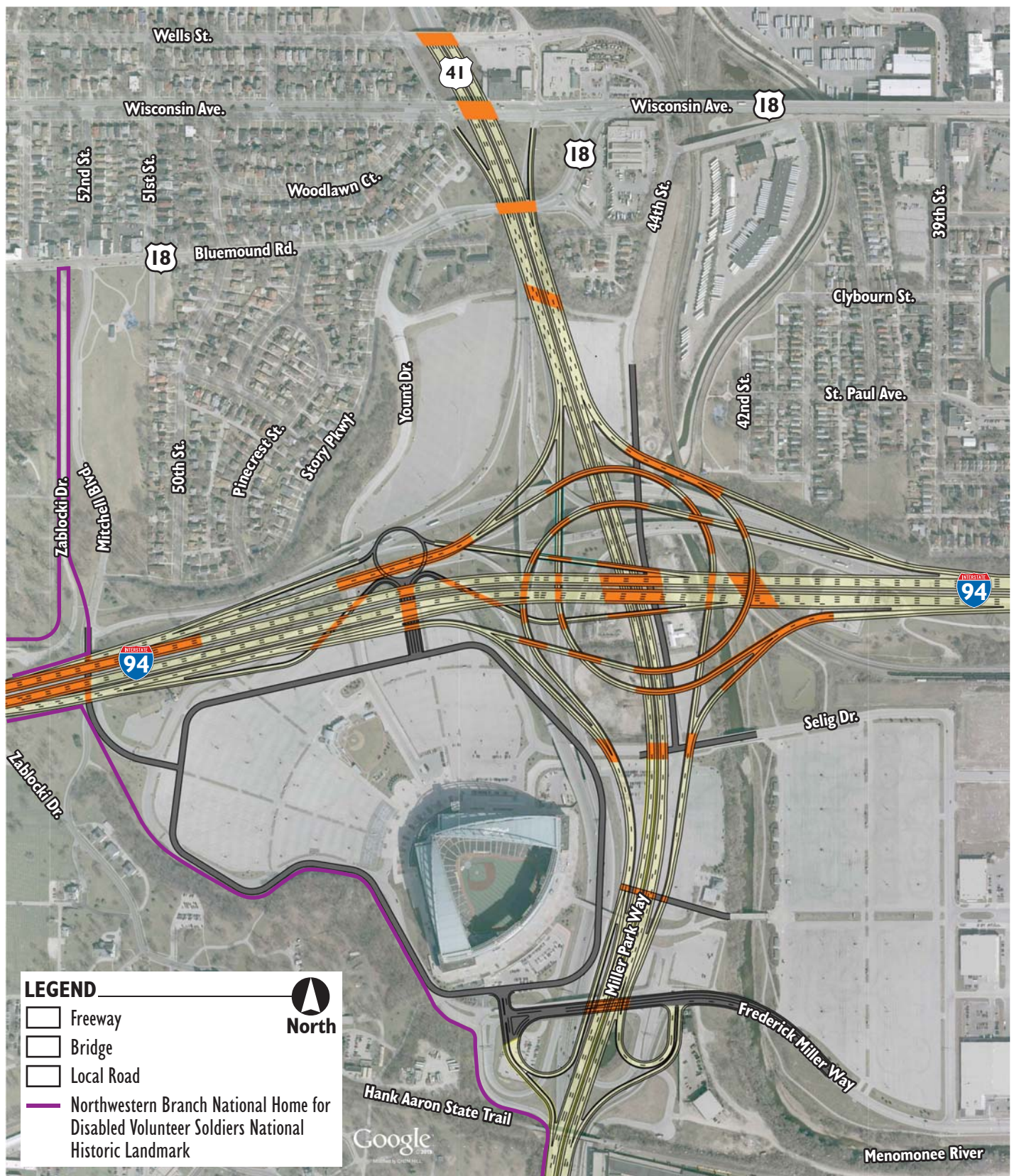


Alternative eliminated from further consideration

Exhibit 2-23

Stadium Interchange Segment Modernization Alternative S1
(System Interchange-Stacked)





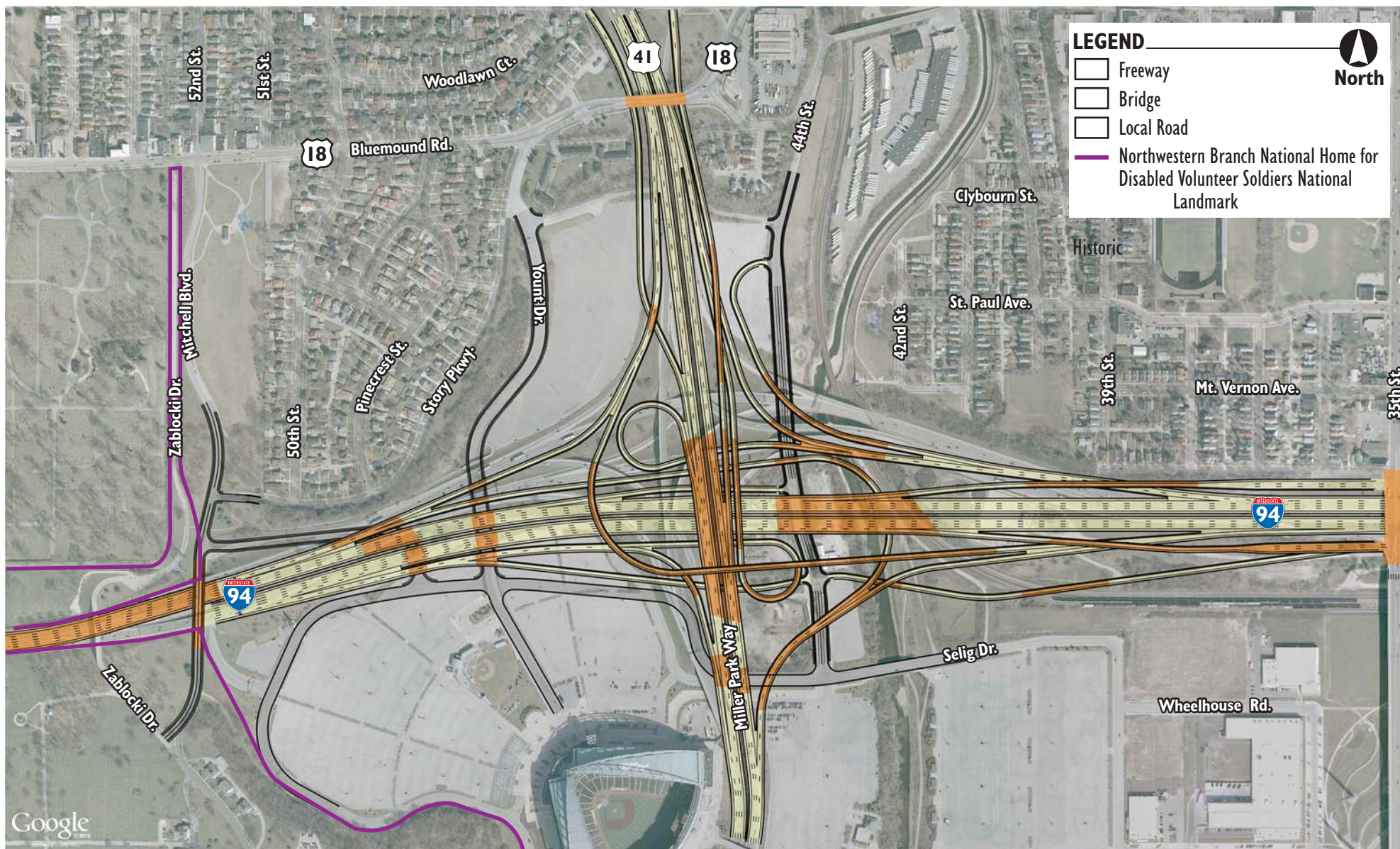
Alternative eliminated from further consideration

Exhibit 2-24

Stadium Interchange Segment Modernization Alternative S2
(System Interchange–Turbine)



U.S. Department of Transportation
**Federal Highway
Administration**

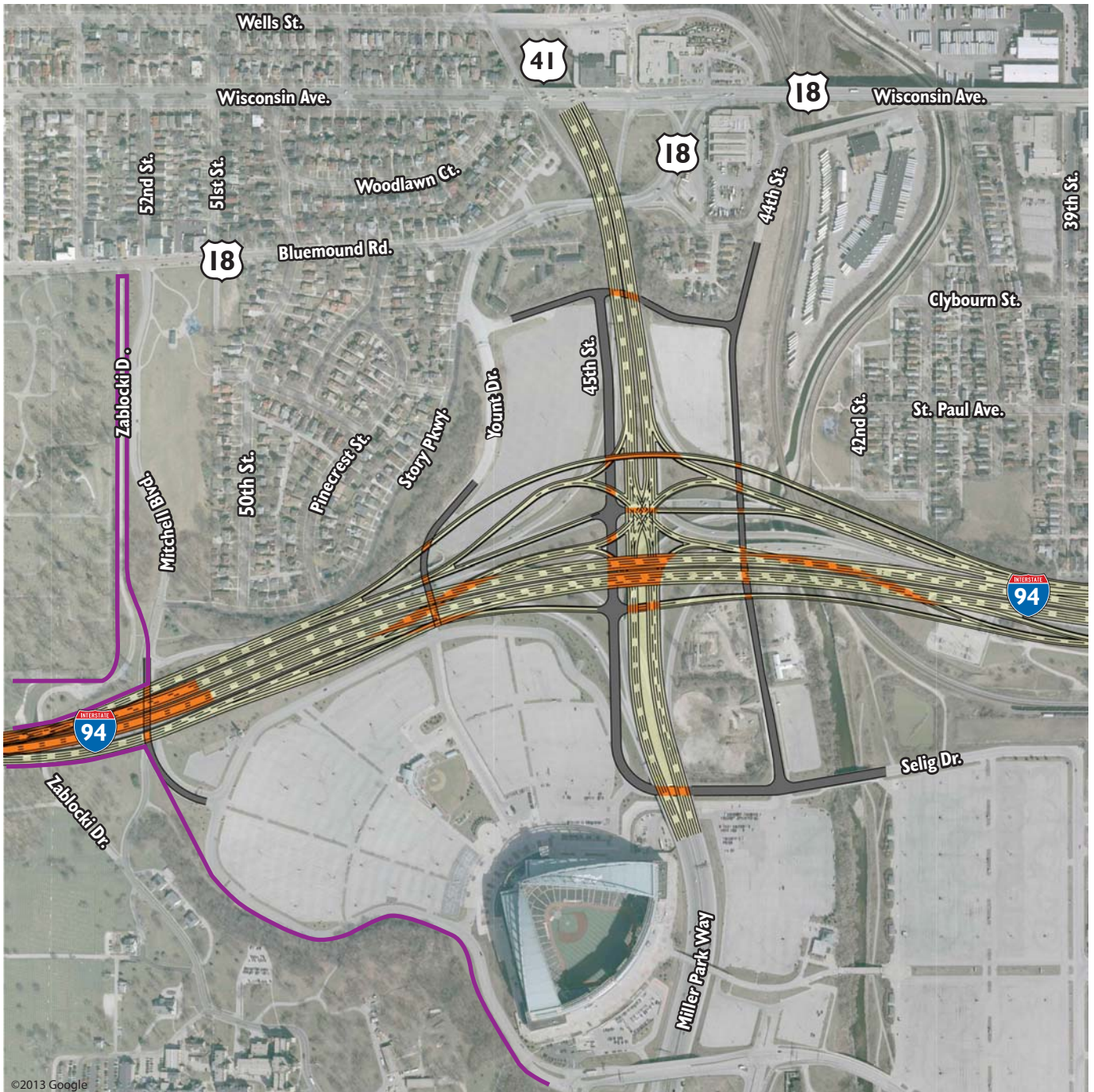


Alternative eliminated from further consideration

Exhibit 2-25

Stadium Interchange Segment Modernization Alternative Modified S2
(System Interchange—Low-Speed Free Flow)





LEGEND

Freeway

Bridge

Local Road

Northwestern Branch National Home for Disabled Volunteer Soldiers National Historic Landmark



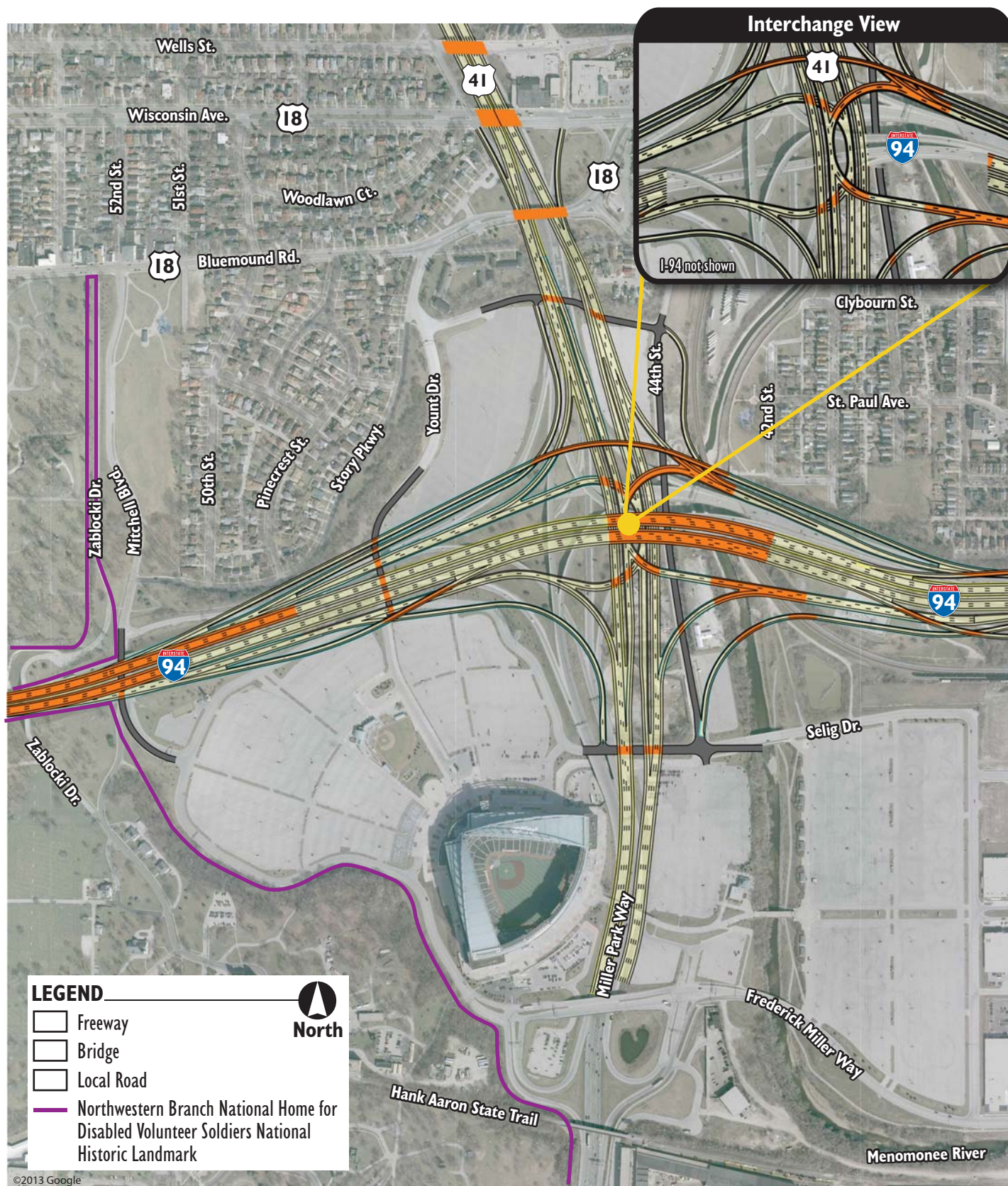
North

Alternative eliminated from further consideration

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U.S. Department of Transportation
Federal Highway
Administration

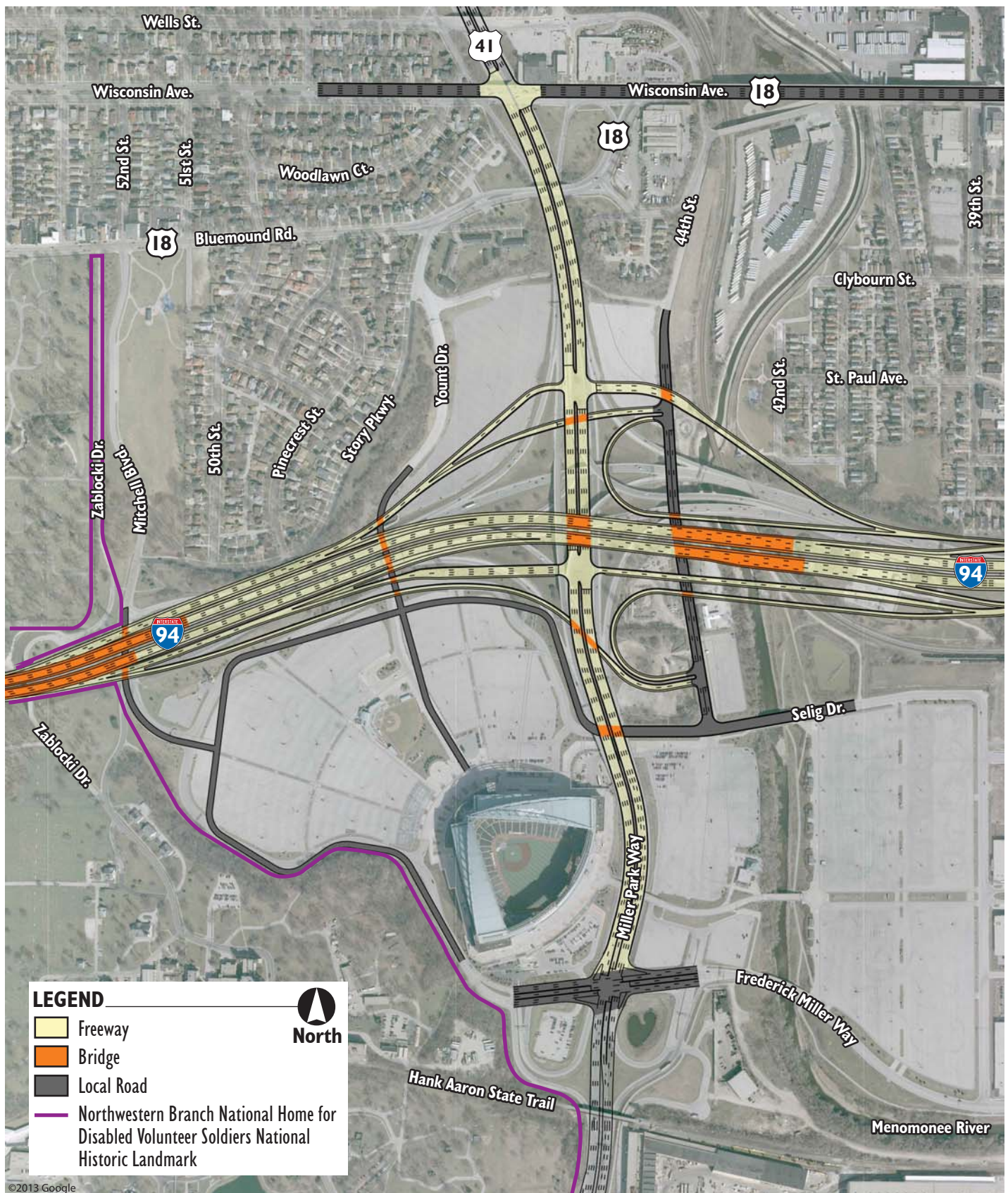


Alternative eliminated from further consideration

Exhibit 2-27

Stadium Interchange Segment Modernization Alternative S5
(Service Interchange – Modified Echelon Interchange)





Alternative eliminated from further consideration

Exhibit 2-28

Stadium Interchange Segment Modernization Alternative S6

(Service Interchange – US 41 Diamond with Event Partial Cloverleaf at 44th Street)

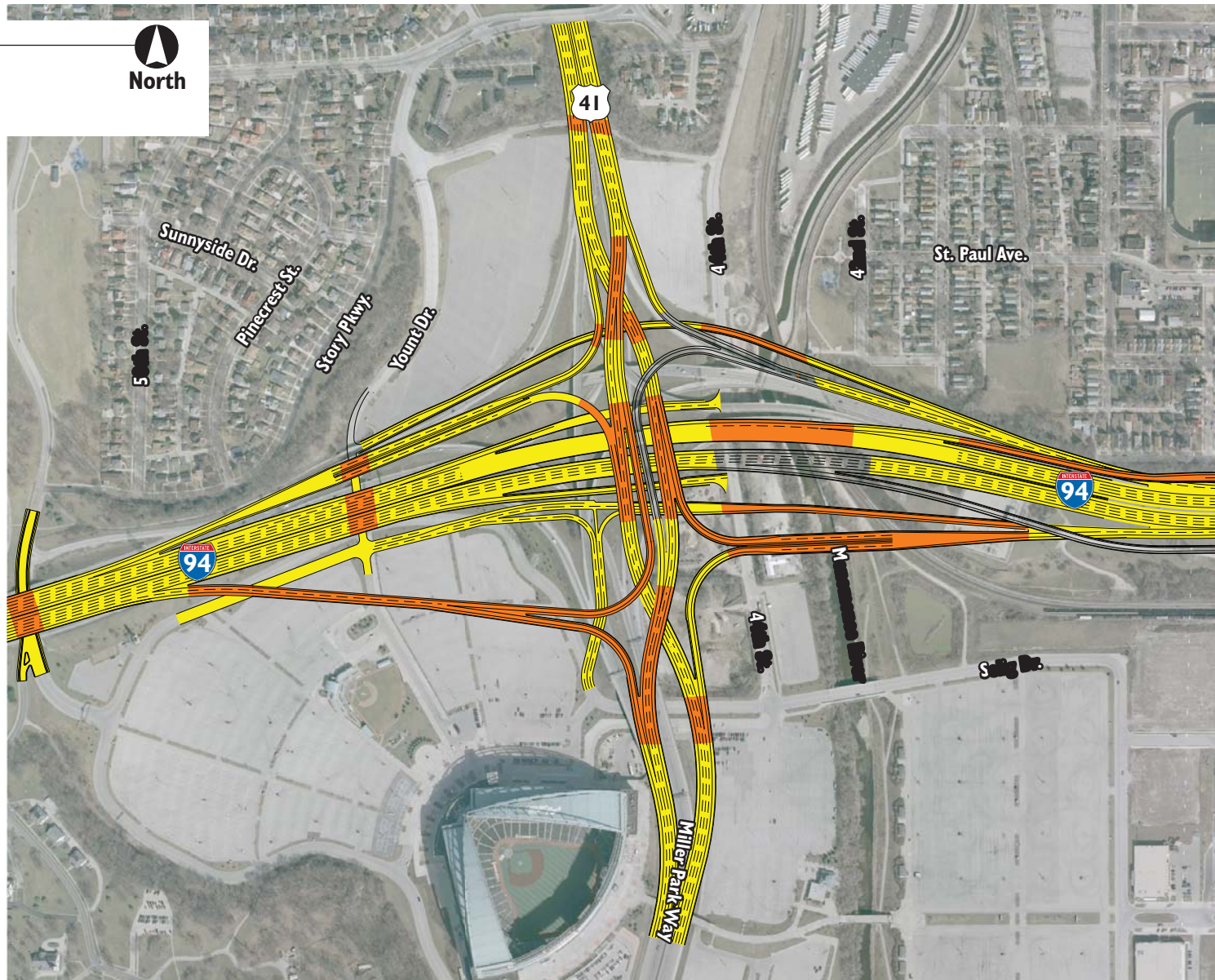


LEGEND

 reeway

 Bridge

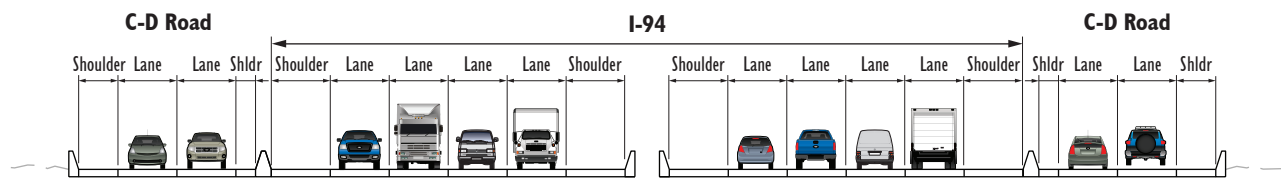
Bridge



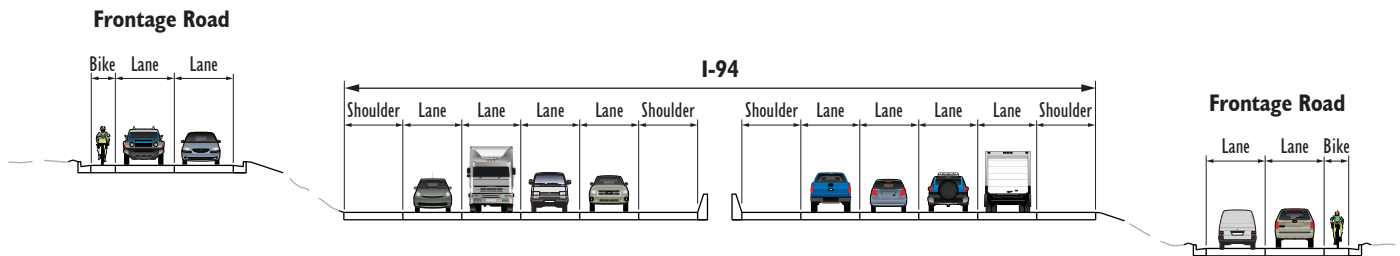
©2014 Google Earth

Alternative eliminated from further consideration

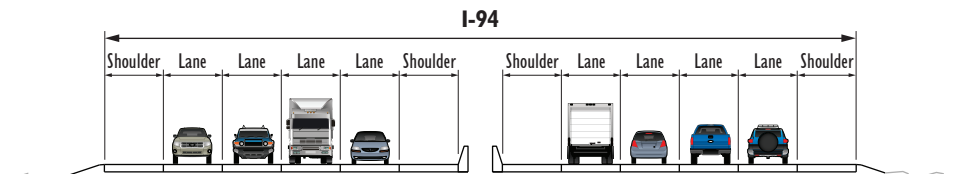




East Leg Modernization Alternative E2

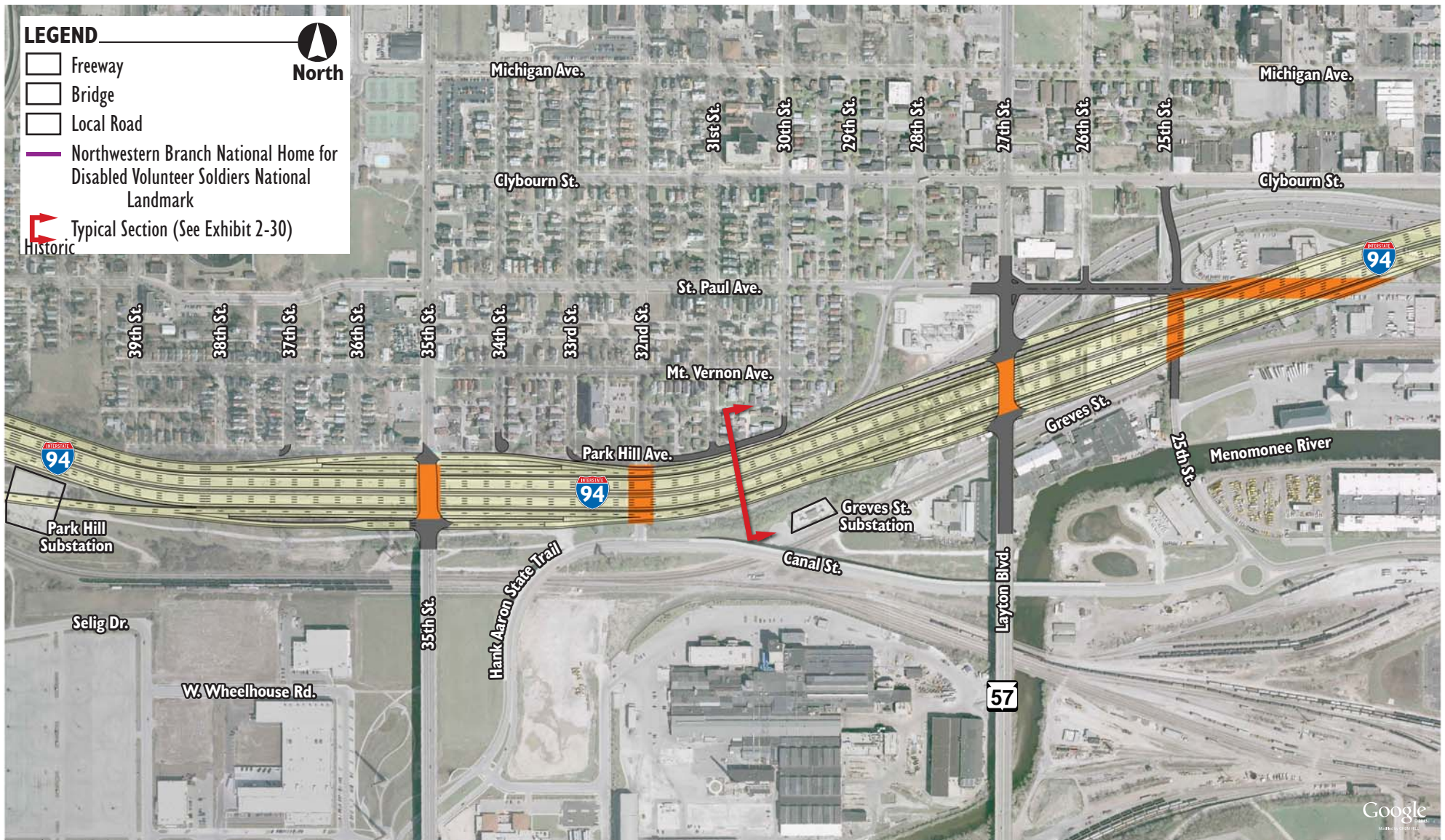


East Leg Modernization Alternative E3



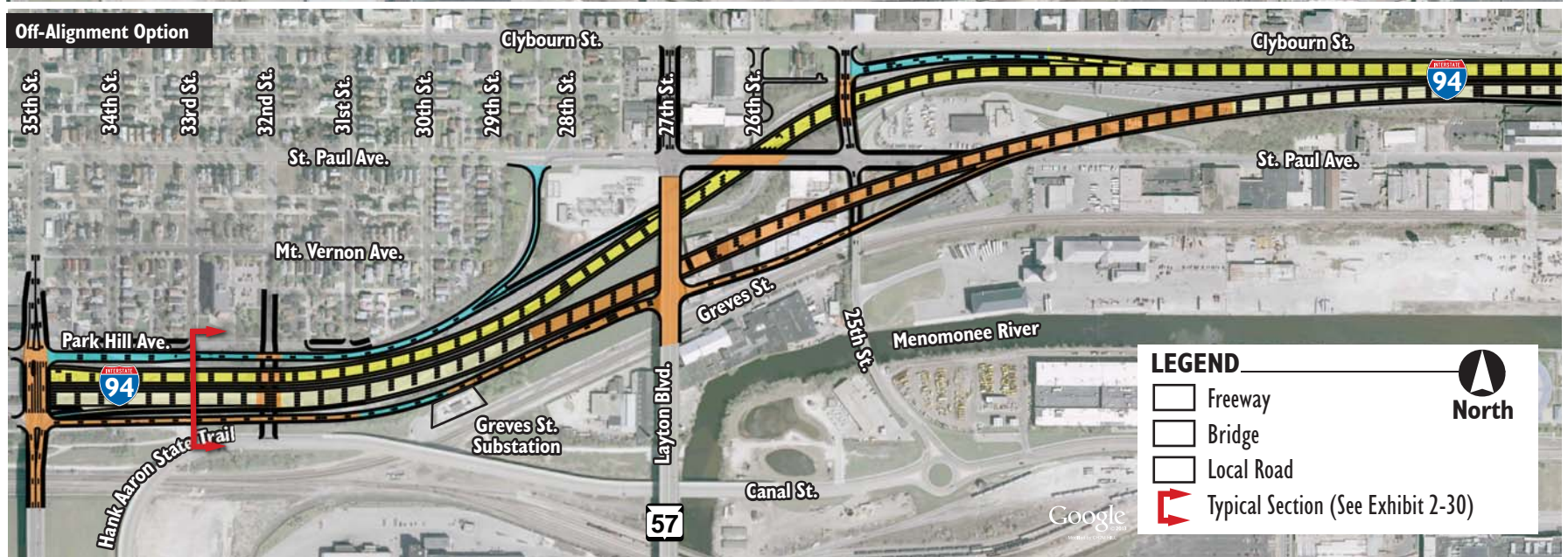
East Leg Modernization Alternative E4





Alternative eliminated from further consideration

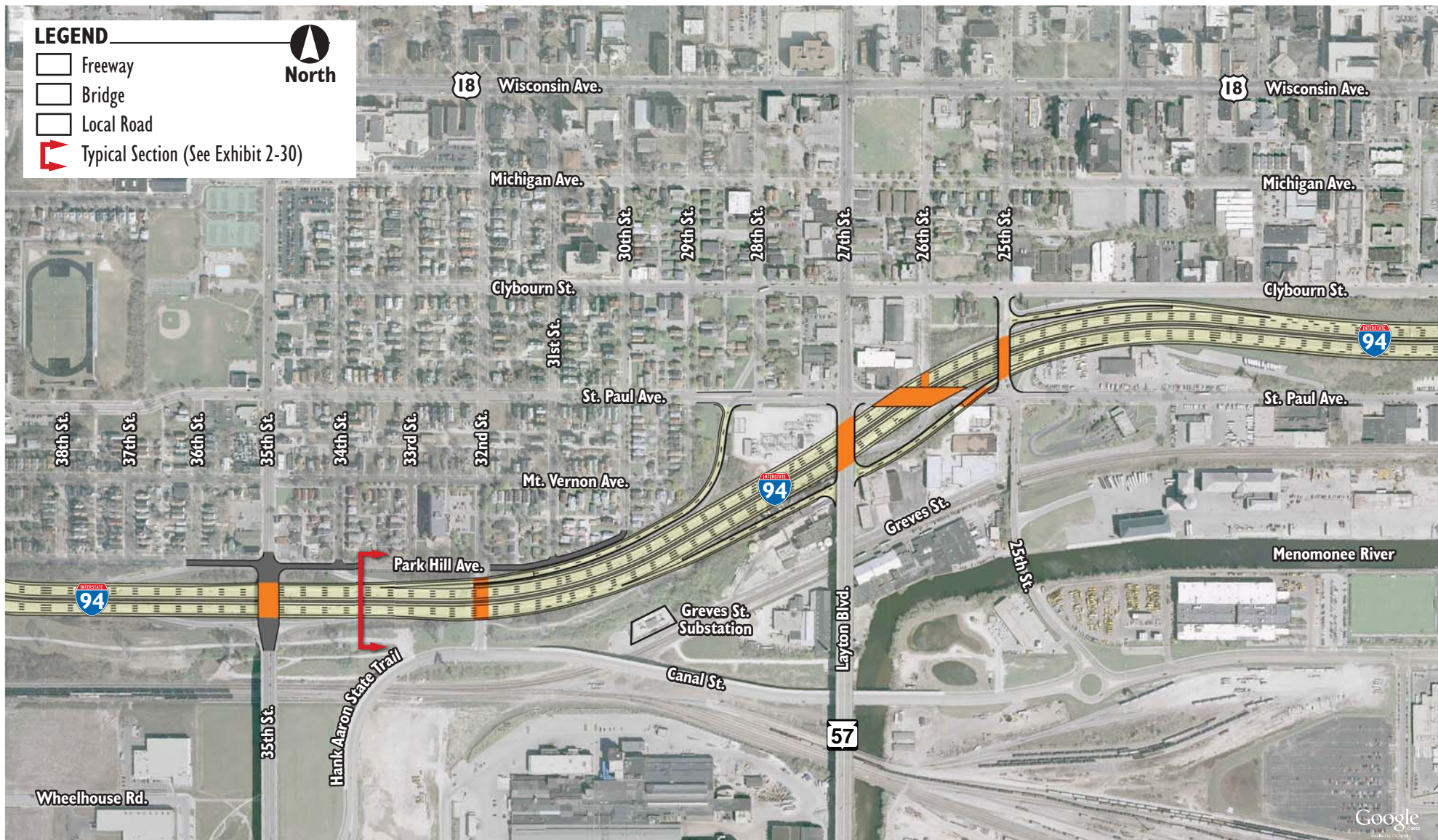




Alternative eliminated from further consideration

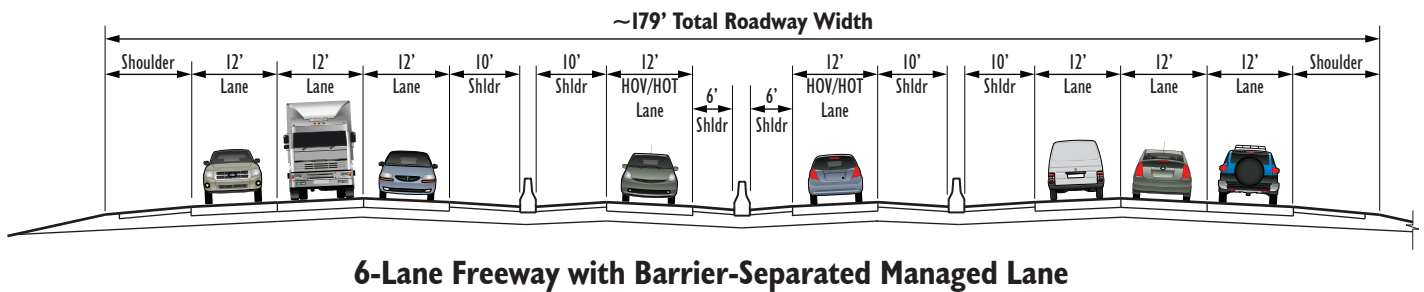
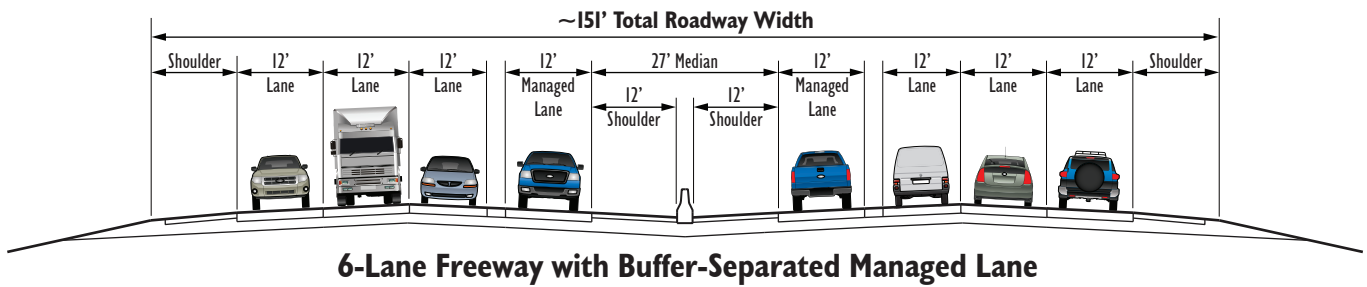
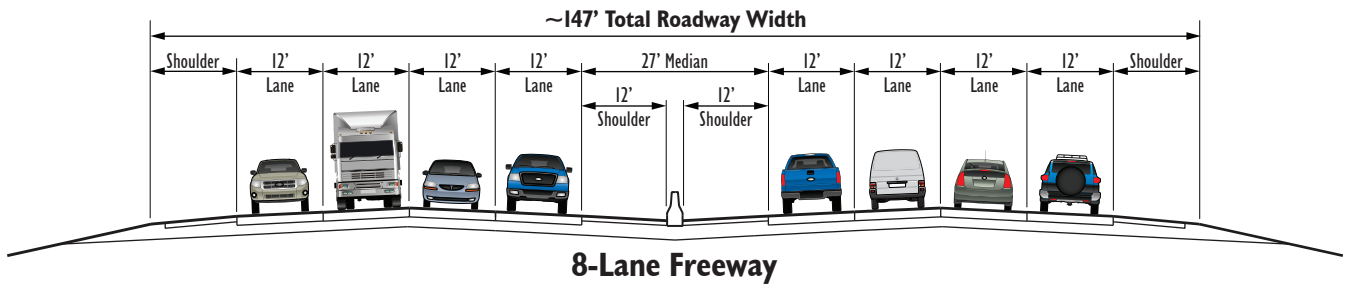
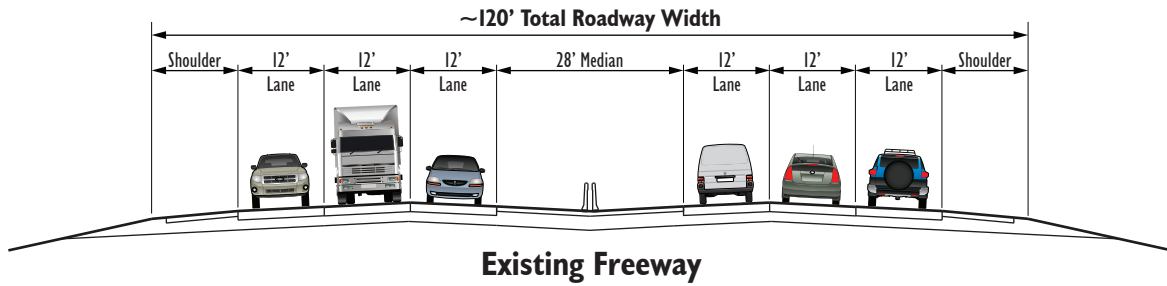
Exhibit 2-32
East Segment Modernization Alternative E3
(Frontage Road)





Alternative eliminated from further consideration





For reference only, not specific to the I-94 East-West Corridor

